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Atlantic City Convention of the N. E. L. A.

SERVICE in its highest, deepest, broadest sense was the nucleus about which the convention activities of the National Electric Light Association at Atlantic City this week concentrated. There was no escape from its spell. Conscious of its ability and power as a creative and directive force in the community and in the nation, this association of public utility interests solemnly pledged its all to the government in the holy cause in which we and our allies are now engaged. Is there, can there be any doubt of the whole-hearted patriotism of the central-station companies of America? Have they not endured suffering and privation in a material and monetary sense at the hands of the government? Have they not been chastened and sorely tried in spirit by the uncertainties and the realities of legislation? And have they not borne all gladly and willingly because it was for the public good? One motive dominates, and one only—service. Selfishness has no place in it. The spirit of sacrifice which animates the American people also animates the electric lighting interests, and while the reward of victory will eventually and surely come to us as a nation, recognition has already in large measure been attained by the electrical industry.

The war has done more for the electrical industry during the past year than all other agencies combined. It would appear as though the nation had discovered electricity anew, so confidently and enthusiastically do the government and the war industries turn to it for the power to fashion and weld the thunderbolts which our brave soldiers hurl at the enemy. We need production of food, ships, munitions and other things to win this war. Time was when the prowess of one human being was matched against that of another, hilt to hilt; but that time has passed. Nation now faces nation, production is matched against production and engineering skill against engineering skill. The final victory will be won "over there," but only because of the production "over here," and the greatest aid to that production is electricity. Therefore, the obligation to supply that electricity is very real, and it is comforting to feel that the central-station interests realize it and that the Fuel Administration stands ready to aid.

We commend to the prayerful consideration of every public utility executive and operator the address of Samuel Insull, delivered at the Thursday night session of the association. From the wealth of his experience with the largest central-station system in the world he spoke authoritatively and reassuringly of the outlook. Naturally he is gratified at the trend of developments and the belated recognition of the economy of concentrated power production from superstations. It needs no second taste to detect the seasoning which makes the dish so palatable to American operators. Mr. Insull has been the leading exponent of the central-station industry in that cause and in the welding together of great distribution networks. The striking passages of Mr. Lieb's admirable presidential address also will bear much re-reading, indorsed as they are by the committee to which they were referred and by the association. It would be difficult indeed to find any vital phase of central-station operation that was overlooked in the convention program or on which advice and guidance were not freely given. Certainly the coal situation and the financial situation, the two most pressing problems, were adequately presented and discussed from all angles.

Certain outstanding features of the convention were so apparent that they could not but impress themselves on the consciousness of all in attendance. The necessity for storing coal before the winter and of using it economically was manifest both from the warnings of the Fuel Administration representatives and from the testimony of utility operators themselves. Nor could sight be lost of the fact that electricity must be conserved for war industries and withheld from industries under the ban of the administration. Wider interconnection of generating systems with a view to the saving of money, equipment, coal and transportation, not to mention the increase in the reliability of service, must obtain and may be insisted on if the war is of long duration. The utilities must also, if they are to be kept in condition to render good service, be granted an increase in rates. On their part they must husband all their financial resources, curtail extensions and endeavor to arrange their financial affairs without much assistance from the government. Certain economies are possible in power-house operation and in distribution circuits, and these should be effected as speedily as possible for patriotic as well as for selfish reasons. Maximum output and use must be found for all apparatus, labor must be spared, and attention given to the substitution of female for male help in various departments. Opportunities in the electric vehicle field for relieving transportation congestion and for hastening distribution in industrial plants should not be overlooked by central-station companies in their endeavor to measure up to their enlarged standards of service in helping to win the war.

With due consideration and study of these important points in a broad and patriotic spirit there can be no doubt as to the ultimate outcome. The central-station industry is destined to go forward; the war has pushed it on, and under that impetus it can outrun all calculations if those in charge will it so.

Interconnection Does Not Mean Monopoly

AS THE interconnection of central-station and transmission systems develops into a general network of energy supply, it is important for the local publics concerned to realize that such a program is primarily an efficiency measure. War accelerates negotiations between interests which in peace times might work for years with little or no physical co-ordination. The necessity for accomplishing results at lower unit cost is enormously increased as a nation of highly complex industrial organization goes deeper and deeper into the conflict. Hence many steps are taken to meet acute national needs which in normal times could not be carried out except at the price of protracted public discussion, prolonged negotiations and often needless delays. The emergency nature of many things done under the stress of war conditions, however, should not prevent utility managements from clearly setting forth their economic benefits, their patriotic value and their freedom from ulterior motives.

We say this because there is a feeling in some quarters that interconnection of electric systems is being furthered chiefly that a monopolistic control of distribution may be established. Even in the minds of some public utility commissioners there exists an opinion that interconnection is a camouflage for absorption. As a practical matter, interconnection is fundamentally a give-and-take affair, worked out in relation to such technical variables as local loads, available generating capacity, size of conductors on lines, installed transformer ratings, stages of water in streams and reservoirs, duration and extent of demands, location of demands, and cost of fuel, labor and unit power, whether primary or secondary. In a well-worked-out plan energy may be fed in one direction to-day and in the opposite direction to-morrow, or such a reversal may occur during a single twenty-four-hour period. By and large, the idea is simply to generate, transmit and distribute energy at specified points at the lowest attainable cost, conserving fuel, labor, water, supplies and capital outlay as well to the utmost consistent with first-quality service.

Given a workable agreement among the parties to an interconnection scheme, the question of ownership is really no test of its value. There may be, of course, a monopolistic intent behind any co-operative plan, but the fact that co-ordination of agencies is sought is no indication of it. Team play in energy interchange between adjacent utilities is primarily an economic affair; it should be judged according to the engineering and commercial benefits which it insures, and not by the possibility of abuse arising from community of interest.

There are plenty of ways in which the public welfare can be safeguarded against exploitation; in fact, the publicity necessary to-day before utilities may formally unite and issue securities therefor with the approval of a public regulating board leaves little to fear from the advance of the usual interconnection scheme. Early setting forth in each case of the benefits to all interests from such a program will go a long way to disarm ill-advised criticism and to convince the public and the service commissions which protect its interests that the plan is a praiseworthy one.

Interconnecting New England Power Stations

THE shortage of coal in New England during the past season has been a very serious matter, affecting generating stations all over the territory, and the situation threatens to be little if any better during the coming season. The warning has already gone out that trouble in transportation is to be looked for. Particularly pertinent therefore at the present time is the study of interconnecting plans for New England stations developed by L. L. Elden, the accomplished engineer of the Boston Edison company, embodied in an address before the New England Central Station Power Engineers' Association and noticed in an article in our issue for June 8. In brief, he estimates that within the New England territory interconnections can be made at a cost of about $2,750,000 which would be sufficient to release 50,000 kw. in equipment for additional service. New England is, on the whole, covered by power distribution systems, but they have not been as yet skillfully interconnected as a whole. The Boston Edison company gathers between 400 and 500 square miles (from 100,000 to 130,000 hectares) into its distribution territory. South of Boston, running all the way down to Fall River, are other systems, each covering its own district but not working in co-operation. To the northward lie plants along and near the coast as far as Portsmouth, N. H., and inland to Lowell, Mass., and Manchester and Concord, N. H., all with more or less scattered service and yet not gaining the advantages of unity.

Westward there is another great territory, in part reached by the hydroelectric system of the New England Power Company, with stations on the Connecticut and Deerfield Rivers. Plans are now under way for bringing this power into Boston; it already reaches Fitchburg, Worcester and Providence, as well as some nearer points. Mr. Elden's proposition looks to a thorough linkage of all these distribution networks so that the aggregate capacity of all will be available throughout the whole territory taken in. To the south there is no difficulty in linking the lines so as not only to interconnect them with the Boston Edison company but, without much difficulty, with the New England Power Company as well, providing what amounts to a ring system of distribution. To the northward interconnections with the Edison company are already in force and may be easily extended, while it is no long reach from the northern lines of the New England Power Company to those in the Merrimac Valley and again those in eastern New Hampshire. The practical result would be to gather into one physical entity electric lines serving a territory reaching from Providence and Fall River on the south to Manchester, Concord and Portsmouth on the north, covering, with its connections already existing, the major part of the great manufacturing territory of New England.

Could this be accomplished before winter sets in, as is perfectly possible, the fuel situation would be very much relieved, for most of the deliveries could be then made at various tidewater plants. A considerable number of small stations, relatively inefficient, could be shut down altogether, and Mr. Elden estimates the annual reduction in coal consumption at at least 70,000 tons, no insignificant amount at present prices and with the increasing stress on transportation facilities. It is a

large but particularly sensible project which he has set forth, and if carried out it would be of great benefit to New England territory. The distances to be covered are altogether conservative. There is no need for extreme voltages and no call for any construction of extraordinary difficulty or cost. As to feasible methods of accomplishing such interconnection, the necessary pooling of interests for direct action might not prove to be easy, but the formation of a subsidiary company to attend to the distribution on a fair basis of cost to all the contributing companies ought to be easily within the bounds of possibility and could carry out the work quickly and effectively.

The project outlined as a whole strikes us as being a particularly desirable one, to which very careful attention should be given.

Secrecy in Research for War Purposes

MUCH of research and development work done under the direction of the Council of National Defense is shrouded in deep mystery. Not only are the subjects and the methods of investigation treated as confidential but even the places and the persons doing the work are not supposed to be generally known. It is only natural that the general public should be curious to know what is being done and what results have been achieved, and there is a still more natural desire on the part of various specialists to learn of the difficulties and methods of attack. Thus, electrical engineers at large like to know what special electrical problems are confronting the army and the navy, what is being done to solve them, and who are the trusted ones chosen to do the responsible work.

While the ELECTRICAL WORLD realizes the duty of keeping its readers fully informed up to the minute upon the electrical features of the great war, it also is aware of its higher duty to the country of not giving out information that may help or give comfort to the enemy. In most cases important information is impossible to obtain anyway, but even where an interesting item of confidential war news of an electrical nature has been learned inadvertently through some local worker in the field the editors without hesitation place their duty to the country above that to their readers and withhold such items from publication.

Apparently the great majority of our readers fully appreciate this delicate situation and are satisfied with the general items of news, such as those giving the personnel of the various central administrative committees of the Council of National Defense and of its affiliated bodies. The number of "registered kicks" has been remarkably small and probably does not represent the actual amount of dissatisfaction in the electrical ranks. Chief Engineer A does not understand why Chief Engineer B of another company has been appointed chairman of the committee on "electric sparks for the navy," while he, who knows infinitely more about sparks than B, has not even been asked to serve on the committee. He wants to know how little the committee has accomplished so as to have a tangible reason for telling his friends at the club that things are pretty rotten over in the little district between Maryland and Virginia. Also Professor X can hardly believe his ears when he finds out that his colleague, Professor Y, whom he never considered his equal, has had allotted to him some mysterious problem on micro-amperes the nature of which even the president of the institution is not allowed to learn. Now Professor Y walks on the campus with the air of a superior being, while Professor X feels mortified and slighted, almost to the point of doing something which will redound to the benefit of the country on his own hook.

Opinion has been expressed that an extreme secrecy in war research is unnecessary in most cases, because the Germans are ahead of us in the defensive and offensive weapons of modern warfare and in finding substitutes for scarce supplies. But these critics forget that considerable interference with the progress of the work would undoubtedly result were not the problems kept secret. With fires and explosions occurring frequently even in well-guarded munition factories, what chance would an individual scientific investigator have against the destruction of his apparatus and data by malicious persons? Moreover, the enemy must not know when we have solved a problem, nor should he get comfort from the knowledge of our failure or delay in obtaining a solution.

There is another reason for which much of war research must remain secret, and that is to avoid public discussion and controversies that would delay the work. Doing government work secretly and without the benefit of professional criticism is rather unusual and contrary to the spirit of this country, so that we are all the time tempted to "butt in," forgetting the unusual conditions under which the country is laboring and that this is literally the case of "à la guerre comme à la guerre." The war has forced us to be secretive, almost undemocratic, and this change should be one more powerful reason for making a supreme effort that this war shall be the last.

Some of the highest and best representatives of the electrical and other professions have been called into the principal committees that guide the research activities of the numerous workers throughout the country, and this fact alone would be a sufficient safeguard to insure that on the whole the work is being done efficiently and honestly. For the rest, our first duty as specialists is to register our qualifications with the proper governmental agency and to keep ourselves in readiness to do our share if and when called upon.

The Coming Issues

FROM all appearances a serious fuel situation will exist next winter; therefore every effort should be made to eliminate unnecessary and wasteful uses of electric energy, to improve the efficiency of steam production and utilization, and to procure fuel before the winter rush sets in. What New England industrial plants are doing along these lines will be discussed in a coming issue. Another subject of interest to central-station engineers will treat of the use of iron wire for series lighting circuits, and particular attention will be directed to economic considerations Other articles scheduled for early appearance will deal with features of construction employed on long-span mountain lines and with the development of search-lamps.

The N. E. L. A. "Win the War" Convention

President Lieb Sounds the Keynote in Stirring Patriotic Address, and Strong War Resolutions Are Passed While Current Problems Are Considered— W. F. Wells Elected President

WAR conditions touched the attendance at the convention of the National Electric Light Association at the Hotel Traymore, Atlantic City, on Thursday and Friday of this week, but they did not dampen the enthusiasm of the delegates for the country which they serve or lessen the readiness to make every atom of sacrifice to win the war. Under the call of national necessity there was a remarkable concentration of thought, purpose and pledge covering all the resources and wide activities of a great industry. The business done was vital to the utilities. It was an earnest promise of co-operation in every government measure. It was a vigorous assurance of help in every possible way leading to victory.

The Opening Session

When President John W. Lieb let his gavel fall at 9.40 o'clock on Thursday morning for the forty-first convention, the thirty-fourth annual meeting, he looked upon an audience which included many men notable in the industry. Devotion to war-service needs was the keynote from the beginning of the first session.

Following the brief introductory remarks of Mr. Lieb a hearty "welcome to the city" was extended by Mayor Bacharach.

A letter to Mr. Lieb from Thomas A. Edison was read by Secretary T. C. Martin. Mr. Edison, expressing regret that war-service duties made it impossible to be present, wrote:

"I am much pleased to note the active part which the industry is taking in making available to the government the vast resources in men and materials which the central stations have available, and the hearty response which their employees have given to the call for service at the front and in all kinds of co-operation in the war activities of the government."

During the reading of the presidential address W. F. Wells occupied the chair.

Mr. Lieb's address was not only a discussion of the work of the year and a presentation of the large problems of the industry under war conditions; it was also a fine, strongly patriotic outline of our national ideals and unswerving purpose in the war.

"If we take a broad-minded survey of the whole field, and consider all the circumstances and conditions surrounding our national life," said Mr. Lieb, "we must come to the conclusion that what has been accomplished is nothing short of miraculous."

Defining the electrical industry as including electric railway, telephone and telegraph, electric light and power systems, and manufacturers on whose output these enterprises depend, Mr. Lieb said that this important industry employs 920,000 men, represents $10,750,000,000 invested capital, and annual output of $2,675,000,000. Of these totals the electric light and power industry represents 125,000 men, $3,000,000,000 invested capital and annual business of $575,000,000. This branch of public utility service "has become a prime necessity of our civilization, assuming an importance in our economic structure second only to our great railroad systems."

In regard to linking up the regional systems, Mr. Lieb said: "At the present time there is imperative need that our member companies take an advanced position in this matter, in order that every possible advantage may accrue to the nation and its war necessities from the saving in fuel, in plant capacity, in service reliability, and in economy of operation, that is possible through interconnection, exchange of current, and joint operation between adjoining systems."

In going into general economic conditions, President Lieb said that the higher operating costs and the difficulties of getting corresponding advances in rates present a most serious situation that requires the earnest and urgent consideration of the national government.

Mr. Lieb, however, appealed to "every central-station company in the country to go to the very limit of its

power in meeting the urgent requirements of the government, and to respond in a spirit of patriotism and sacrifice to the needs of the nation."

The coal outlook was discussed exhaustively, Mr. Lieb indicating the concern of managers over the coming winter.

Describing the compliance with fuel conservation movements, Mr. Lieb also spoke of the fact that the advancement of the clock to be operative all the year instead of during a limited spring and summer season would have important economic advantages, and would render available a large additional capacity in power plants to be applied to satisfy the present unsatisfied demand of war industries.

A hope for development of the stupendous national asset in water powers was expressed by Mr. Lieb. After taking up labor conditions the president went more into detail on rate-making problems. He showed them the work of the N. E. L. A. and member companies in the war, giving in addition the data on war contributions printed on this page.

The address of Mr. Lieb was received with great applause, and was referred to a committee consisting of Samuel Insull, Joseph B. McCall and Charles L. Edgar.

In the absence of W. H. Atkins, treasurer, his report was read by Frederick Schmitt.

T. C. Martin presented his annual report as secretary.

After Walter Neumuller had read the report of the membership committee President Lieb called upon the sections.

R. J. McClelland, for the Technical and Hydroelectric Section, appointed a nominating committee.

William Schmidt, Jr., reporting for the Accounting Section, announced the following officers for 1918-19: Chairman, Paul R. Jones; vice-chairman, R. W. Symes; treasurer, C. E. Calder; secretary, Frederick Schmitt.

E. S. Mansfield reported as chairman of the Electric Vehicle Section and appointed a nominating committee.

A brief report was also made by E. A. Edkins, chairman of the Commercial Section, and a nominating committee was similarly appointed.

President Lieb then brought up the work of the geographic sections. A. H. Halloran, who had met with the executive committee, had presented three suggestions which will be referred to a committee to be appointed by the incoming president.

An address by Arthur Wright of London, England, who was in this country recently, on "War by Civilians," was then read by Secretary Martin. Apart from its vigorous remarks on the war, Mr. Wright's address touched on the position of the electrical industry as forming a useful illustration of the stimulating effect of war on trade. He said in part:

Electrical power is now recognized as one of the most useful agents in producing the various kinds of war munitions. In most European countries an ever-increasing demand for power has been experienced at much higher costs and rates than in pre-war days. During the last three years in England the tremendous demand for all kinds of manufactured accessories has caused the government to distribute broadcast huge orders for materials and articles among an endless variety of small engineering, woodworking and textile shops with the result that a wholly unexpected demand from them for electrical power, motors, cables, switches, lamps, etc., has occurred.

Unfortunately, the electrical utilities in the early years of the war, owing perhaps to the belief in its probably short duration and to the higher price of money, materials and labor, allowed their active power plant, stocks of materials and standby plant to get into a state of disrepair and low in quantity, so that when the demand for additional power came in 1916 and 1917 they were unprepared, in many cases, to meet it or began overloading the plant with the usual consequences of frequent breakdowns. Some other electrical industries have not benefited by the war, such as those dealing in expensive lighting fixtures and luxury appliances, yet the manufacturers who have understood the altered conditions have not only benefited greatly by the war demands, but have indirectly materially helped their country.

If public service commissioners can be convinced of the very essential nature of electrical power in war times and made to realize how seriously the present high price of money, plant and labor must affect the cost of producing electrical energy, it surely should not be difficult to obtain their consent to raise the rates to meet these present higher costs. Thus utilities would be assured of a fair return on any existing or new investment required to meet the increased demand for supply during the period of the war and the subsequent years of reconstruction with their multiple problems.

PRESIDENT-ELECT W. F. WELLS

MEMBER COMPANIES' WAR CONTRIBUTIONS

	Number	Amount
Liberty loans:		
First loan—Company purchases of bonds		$6,567,950
Second loan—Company purchases of bonds		9,552,800
Third loan—Company purchases of bonds		13,434,500
Total		$29,555,250
First loan—Employees' purchases of bonds	35,108	$3,662,150
Second loan—Employees' purchases of bonds	35,212	3,851,950
Third loan—Employees' purchases of bonds	53,278	5,229,100
Total	123,598	$12,743,200
War Saving Stamps, amount sold		$680,728.91
	Number	
Employees engaged in campaign	6,778	
Officers utilized in campaign	618	
Red Cross subscriptions—company		$1,095,159.67
Red Cross subscriptions—employees	44,129	372,786.02
Total		$1,467,945.69

E. W. Lloyd opened discussion on "Line Extensions in War Time." He contrasted the old conditions, under which central stations had optimistically thought it good policy to make line extensions, with present conditions, where inability to raise capital and scarcity of materials and labor have forced a reversal of practice. He urged the appointment of a committee to consider the subject and make recommendations.

Many interesting points were brought out in the discussion, in which W. H. Johnson, T. I. Jones, C. D. Marsh, D. H. McDougall, James T. Hutchings, M. R. Bump, V. E. Bird, L. H. Scherck, H. C. Abell, W. P. Schwabe and J. W. Lieb took part.

PAST-PRESIDENT J. W. LIEB

Thursday Afternoon Session

Thursday afternoon's session was devoted to reports from three committees—the National Committee on Gas and Electric Service, of which J. W. Lieb is chairman; the National Committee on Public Utility Conditions, P. H. Gadsden chairman, and the public policy committee, W. W. Freeman chairman—and a symposium on labor problems of the hour.

Financial Relief Only Through Government

Mr. Gadsden very impressively pointed out the inadequacy of rates to meet present conditions and declared that relief from the existing critical financial condition is only available through the help of the government. Not only are operating expenses higher than ever before, but $250,000,000 in public utility securities will mature during 1919, and enormous investments are required to provide the increased service demanded by war industries. To provide the additional station and substation equipment alone, nearly $200,000,000 will be required in 1918. The serious part of the situation is that ordinary channels of financing are not open owing to the war conditions.

Even if the government's help can be secured in meeting maturity of securities and in obtaining money for extensions, however, the fundamental problem still remains—that of securing rates which will permit the companies to exist.

While a few scattered commissions had granted increases of rates to meet war conditions, the committee on public utility conditions thought it could obtain more prompt relief by securing government action on the matter. By showing that the central station business is the very foundation of war industries and an absolute essential to the prosecution of the war, the committee was successful, through Secretary of the Treasury McAdoo, in securing an expression of opinion from the President of the United States, who said: "It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that in view."

With this expression of opinion in hand, the committee has endeavored to open the eyes of the state commissions and local regulatory bodies to the national importance of adjusting rates. To do this, it has appointed committees in every state whose duty it is to call attention of these bodies to the desperate condition of public utilities and to show how intimately their success is connected with the national welfare. It is the hope that this committee can work out the salvation of the industry. Between 600 and 700 rate increases have been allowed since Jan. 1, 1918.

The Investment Bankers' Association thoroughly sympathizes with the committee regarding the situation and has established committees in several Middle West states to assist in bringing about rate adjustments. The American Bankers' Association has also offered its co-operation.

Expressing the opinion of the National Committee on Public Utility Conditions, Mr. Gadsden said that he is firmly convinced that the federal government has the right to fix rates of public utilities that will enable them to exist in time of war. Whether it can be induced to do so remains to be seen.

In trying to obtain relief from the War Finance Corporation for financing new extensions, the committee was greatly discouraged by the corporation's decision that it could not give relief and that help would have to be secured through banking channels, despite the fact that the committee had already tried this and every other obvious course. Ever since this decision the committee has been making further efforts.

SECRETARY T. C. MARTIN

VICE-PRESIDENT BALLARD

Mr. Gadsden referred to the remarks of Mr. Warburg, Federal Reserve Bank, who emphasized the nation's need of investors' savings, saying that these cannot be obtained unless corporations be placed on a financially successful basis. In closing the speaker invited the hearty co-operation of all in the industry in finding relief from the problems named.

In presenting the report of the National Committee

on Gas and Electric Service, J. W. Lieb called attention to various problems which this committee has helped the government in solving. Among them were the following: Service to cantonments, fuel supply, curtailment of lighting, coal zoning system, oil conservation, power supply, enabling coastwise ships and navy to travel through danger zones without being detected by the smoke from their stacks, night lighting, and shortage of equipment.

INDORSEMENT OF PRESIDENT LIEB'S ADDRESS

Samuel Insull, chairman of the committee to which President Lieb's address was referred, made a report

TREASURER F. W. SMITH

P. H. GADSDEN

expressing high appreciation of the views which it contained.

"The address," said Mr. Insull on behalf of the committee, "with singular clearness and in the broadest spirit reflects the attitude of the association and its members toward the great problems which are confronting our country at this crisis in the world's history.

"It is clearly our duty, as he so admirably indicates, to use every possible human effort, to make every sacrifice and to devote our time to the supreme business of the moment—the winning of the war, to the successful conclusion of which every true American should be pledged."

The committee on the president's address presented the resolution published on page 1252 of this issue, which was adopted with great enthusiasm.

PUBLIC POLICY COMMITTEE

W. W. Freeman, chairman public policy committee, presented a report showing that the first year of war produced many results of radical character affecting company operations. Cost of every element entering into service increased in startling degree, and there was correspondingly increased difficulty in securing satisfactory quality in materials and workmanship. The labor problem has been unavoidably complicated by enlistment and conscription and further government requirements.

"With all of these war operations, we are in the heartiest accord and willingly accept the difficulties which they necessarily involve."

It must be evident, however, says the report, that when operating costs increase enormously, there must be a corresponding increase in income if service is to be maintained and financial stability insured.

Consideration of increased rates for service has become a matter of necessity to member companies. The rate of return allowed to the companies has been far below the profits realized and approved for other commercial enterprises and generally no margin of safety has been allowed for fluctuation in expenses or unusual contingencies.

"The utilities companies do not ask or desire war profits," the report says. "They are, however, amenable to the same axiomatic laws as other lines of business and cannot alter the rules of arithmetic in their favor or make their dollars go any further in paying bills than can others. This merely means that rates absolutely must be increased, as necessary, to meet new conditions."

Conservation of capital was also considered. Hearty and vigorous co-operation of member companies in every effort and campaign with relation to the war was recognized as a noteworthy activity of the year.

In the concluding section the committee said:

"We are absolutely united in the idea that all other interests and considerations must be secondary to the quickest possible winning of the war, and the victory of the Allies must be complete and final, no matter how long it takes or how much it costs."

Friday Morning Session

Flag Day exercises, with bugle, the reading of "The American's Creed" by Secretary Martin and the unfurling of the flag opened the Friday morning session.

President Lieb announced the appointment of a committee on line extensions as recommended by E. W. Lloyd on Thursday. The committee is: E. W. Lloyd, chairman; R. S. Hale, Alex Dow, H. C. Abell and M. R. Bump.

Herbert A. Wagner then made a general presentation

PAST-PRESIDENT H. A. WAGNER

of "The Coal Situation as Affecting Public Utilities." This opened a broad discussion covering many phases of the coal problem.

Mr. Wagner emphasized the seriousness of the coal situation and reviewed the figures of estimated production and demand for consumption this year. He called attention to the need of coal for shipping and the navy, comprising the first demand to which everything else must give way, and to the requirements for war industries. The points brought out by Mr. Noyes and Mr. Insull in the addresses of Thursday evening were also summarized by Mr. Wagner.

As the primary question is not one of coal production but one of coal transportation and it is not expected that transportation conditions will be improved it is necessary to look to methods of conservation and greater economy. Much emphasis was placed by Mr. Wagner upon the importance of storing coal during the summer months.

The need of conserving energy and the waste of carbon lamps were urged by Mr. Wagner.

In concluding, the speaker called attention to the laws against discrimination between consumers and to the necessity that the federal or state officials give authority to the companies to withhold energy supply from some customers when it is decided by the government that this step is required as a war measure.

At this point a nominating committee was appointed, with J. B. McCall as chairman.

Report on Resuscitation from Shock

Before proceeding with the discussion on the coal situation President Lieb introduced W. C. L. Eglin, who presented the report of the committee on safety rules and accident prevention and of the new Commission on Resuscitation from Shock.

The committee on safety rules and accident prevention included what was formerly known as the accident prevention committee. It was organized with a separate sub-committee on accident prevention with Charles B. Scott as chairman. The activities of the main committee have been somewhat restricted during the year, but the sub-committee on accident prevention has held meetings periodically as it was felt that work of this character should proceed in so far as possible undisturbed and that active and diligent work on the part of safety departments and others was necessary when the man power of the industry and the nation must be conserved to the fullest extent.

In reference to circular No. 54 of the Bureau of Standards Mr. Eglin said that in view of the situation confronting all utilities it was deemed advisable to present the status of affairs to the Bureau of Standards. A conference was held and the general understanding arrived at was to the effect that the Bureau of Standards would, where regulatory bodies raised the question as to the promulgation of rules, continue to emphasize the desirability of any such rules conforming to those in Circular 54 and that they were to be clearly indicated as tentative and subject to a trial period.

In view of the great importance of the report of the Commission on Resuscitation from Shock and of keeping members informed at once as to the best methods, President Lieb recommended that when an interim report reaches headquarters it be sent to members. This was ordered.

Coal Conservation

Philip Torchio discussed the subject of utilization of water powers as a means of coal conservation. Mr. Torchio spoke separately of the potential water powers of Eastern and Western States and emphasized that the amount of water power east of the Rocky Mountains is insignificant in proportion to the energy required by the nation. Even now in the East the water powers are an insignificant factor for supplying the B.t.u. units needed by the Eastern States. Therefore the future must depend on science to provide B.t.u. units by economizing in the use of coal. In the meantime water powers answer a useful purpose in retarding the days of coal exhaustion. The steam plant must be the backbone of the development in the Eastern States. The use of the water powers should be concurrent with steam utilization.

George A. Orrok referred to the conditions in the anthracite districts, the available fuel in the culm banks and the possibilities of pumping coal by construction of pipe lines.

W. F. Wells discussed the questiton of whether it was desirable for central station companies to purchase coal mines at this time. He spoke of the experiences of several companies and gave some details of the views of the Commonwealth Edison Company on this question.

Charles E. Stuart, chief of the power and light division of the Bureau of Conservation of the Federal Fuel Administration, outlined the large plans for the conservation of light and power in the coal economy program.

R. J. McClelland, chief engineer Electric Bond & Share Company, emphasized the importance to both the commonwealth and the operating company of obtaining clean coal. Even on the very conservative assumption that the use of dirty coal has increased the total consumption 6 per cent (10 per cent in some cases), it means that 1,000,000 carloads of useless dirt

CARRY THE WAR TO VICTORY

Resolved, that the National Electric Light Association, in annual convention assembled, desires to extend to the President of the United States and all others in authority the assurance that in its organization and its membership it is in thorough accord with the fixed determination of the American people and their chosen representatives to prosecute the war with the utmost vigor and to a victorious conclusion, however long it may take and however much it may cost in men, money and other forms of sacrifice.

The goal we seek through the prosecution of the war is the winning of a great peace—a peace so well established that it cannot lightly be disturbed by autocratic force wedded to the doctrine that might makes right. For such an end of the war we are ready cheerfully to submit to such further restrictions of personal and corporate activities and to such further burdens upon private and corporate property and business as may be found necessary to impose upon the people and industries of the country.

We recognize as the one great menace of the future the possibility of an inconclusive peace—an armed truce which would inevitably end in a renewal of the unspeakable horrors of the present war. That must not be, and the only way to prevent it is to carry this war to victory—a victory so complete and overwhelming that the forces of evil will be glad to accept such terms as an outraged world may be willing in justice to accord. No compromise, no half-way measures, no patched-up "scraps of paper," can accomplish this great end; but only the devotion, the patience, the self-sacrifice and the undying patriotism of our people and their great allies.

With a realizing sense of the stupendous sacrifices involved, but with an abiding faith in the ultimate result, we pledge all that we have and all that we are to the holy cause.

is carried every year when we have such vital need of transportation facilities. Besides congesting transportation and tying up men in this business, burning of dirty coal increases the unit cost of power production and seriously impairs the operating efficiency obtainable, thereby making fuel still scarcer.

This situation, if allowed to continue, will undoubtedly result this winter in a greater fuel famine and more serious curtailment of our industries than obtained last winter. Worse still, it may cost us thousands and even hundreds of thousands of lives of our soldiers unless this winter we speed up our program and produce the supplies and instruments for their needs. Another important link in this chain is the efficient burning of coal in our furnaces. Unless a day by day check is kept of the efficiency obtained an insidious decrease will take place, which will add another large amount of unnecessary hauling and transportation congestion. Electrification of coal mines may increase their output about 8 per cent.

Reginald Pelham Bolton emphasized that it is not the central station that is burning coal uneconomically, but domestic users and some hotel, industrial plant and heating system organizations. Employment of unqualified firemen and use of unsuitable equipment are the chief causes of waste.

Alex Dow, president of the Detroit Edison Company, said that companies are anxious to abide by the rulings of the Fuel Administration and other federal bodies, but that it is difficult, if not impossible, to do so in many localities because public utility restrictions imposed by local regulatory bodies have not been lifted. Referring to the problem of securing sufficient fuel to meet demands, he pointed out that slow movement of cars and not shortage of cars is one of the principal hindrances.

P. G. Gossler, of A. B. Leach & Company, New York, referred to a specific case where a substantial coal saving was made by avoiding unnecessary lighting, and L. S. Streng, chief engineer Louisville Gas & Electric Company, suggested prompt unloading of cars to relieve congestion of transportation facilities.

Owing to the time taken up in discussing the coal situation as it affects public utilities, the Technical Section, which assembled the latter part of Friday forenoon for presentation of reports, had little time for discussion. R. J. McClelland occupied the chair. After drawing attention to the fact that the committees had confined their attention to war-time problems he called on various committeemen, whose reports are given on pages 1260 to 1263 inclusive.

DOHERTY AND BILLINGS PRIZES

The committee on Doherty and Billings prize competition reported as follows:

Doherty Medal—H. C. Pollak, Milwaukee Electric Railway & Light Company; subject, "The Electric Range as a Distribution Engineer's Problem."

Billings Prize—G. B. Springer, Commonwealth Edison Company; subject, "Underground Construction."

Honorable Mention—B. H. Blaisdell, Manila Electric Railway & Light Company; subject, "A Kilowatt-hour and the Coal Required to Produce It." Carl Horine, Commonwealth Edison Company; subject, "Electrolytic Chlorine."

A lecture illustrated with motion pictures was presented on Friday evening by Major O. O. Ellis, Infantry, U. S. A., to show how officers and enlisted men of the army are trained by means of motion pictures.

ELECTION OF OFFICERS

J. B. McCall presented the report of the nominating committee, for which the secretary was directed to cast one ballot. The following nominees were thereupon declared elected for the ensuing association year:

President, W. F. Wells, Brooklyn; first vice-president, R. H. Ballard, Los Angeles; second vice-president, Marton J. Insull, Chicago; third vice-president, D. H. McDougall, Toronto; fourth vice-president, M. R. Bump, New York; treasurer, Frank W. Smith, New York; executive committee, to serve three years, H. C. Abell, New York; H. G. Bradless, Boston; J. E. Davidson, Omaha; to serve one year, W. H. Atkins, Boston, and P. G. Gossler, New York.

Mr. Wells was then asked to take the chair with President Lieb.

In expressing his sense of the responsibility carried by the election, Mr. Wells said:

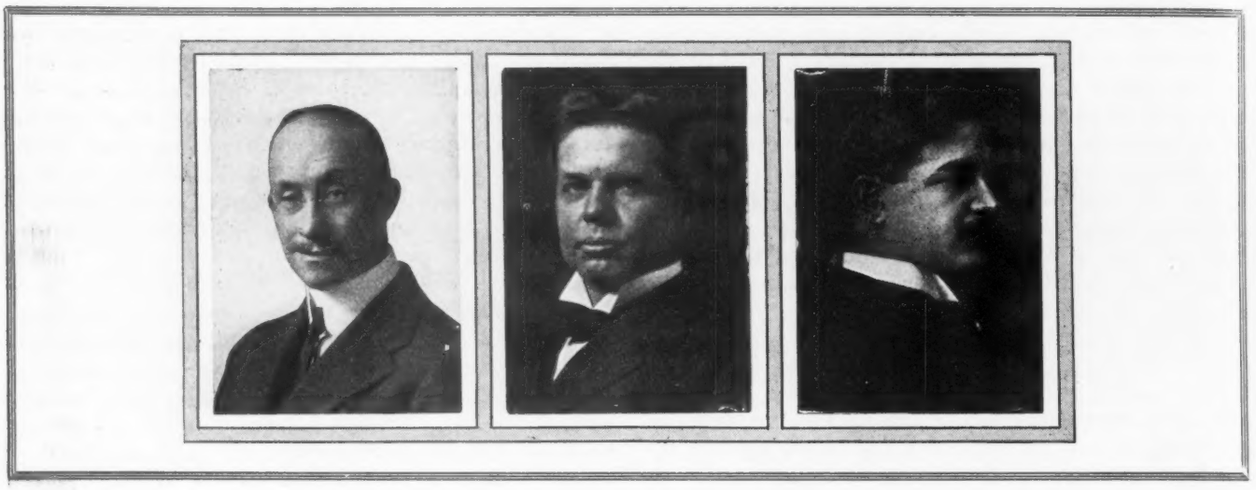
"We will do everything we can to forward the winning of the war. All that I have and all that I am will be devoted to the great cause."

The new executive of the National Electric Light Association has been vice-president and general manager of the Edison Electric Illuminating Company of Brooklyn for the last five years and has been a prominent figure in the electrical development of Greater New York almost since its beginning. He was born in Rahway, N. J., in 1870, was educated at Rutgers College, and joined the Brooklyn Edison company first as a draftsman in 1892. From 1894 to 1897 he was electrical superintendent of the company, which position he resigned to become assistant general manager of the Manhattan Electric Light Company, one of the pioneer electricity supply companies of Manhattan. When the New York Edison Company was formed Mr. Wells was made one of the district superintendents of the operating department. He superintended the installation of the electric plant at the immense Waterside station at Thirty-eighth Street and East River and upon its completion became superintendent in general charge of its operation. He returned to Brooklyn in 1905 as general superintendent of the Brooklyn Edison company, in charge of a great many of its activities. On Jan. 3, 1913, he was elected vice-president and general manager and director. He is also vice-president and general manager and director of the Kings County Electric Light & Power Company, vice-president and director of the Amsterdam Electric Light, Heat & Power Company and a director of the National City Bank of Brooklyn.

Mr. Wells has been active for many years in the National Electric Light Association, having held the offices of treasurer, second vice-president and vice president. He was also president during 1915 and 1916 of the Association of Edison Illuminating Companies. In June, 1915, Rutgers College conferred upon him the honorary degree of electrical engineer. He is a fellow of the American Institute of Electrical Engineers, a member of the American Society of Mechanical Engineers, Franklin Institute, the Illuminating Engineering Society, the Merchants' Association of New York, the Brooklyn Chamber of Commerce, the New York Electrical Society and the Brooklyn Engineers' Club.

Symposium on Labor Conditions

The Rehabilitation of the Returned Soldier Receives Special Attention—Description of the Methods Now Being Followed in Canada—Training of the Blind and Mutilated



LEFT TO RIGHT—D. H. McDOUGALL, S. S. WHEELER, J. T. HUTCHINGS
Contributors to the Symposium on Labor Problems

THE procurement of a sufficient and satisfactory supply of labor was voiced often in the many addresses as one of the vital problems of the hour. Enlistments and drafts have eaten into the ranks of utility operators and employers to a considerable degree. The many aspects of labor supply received a general recognition and brought forth considerable discussion. In fact, this situation was of such importance that a considerable portion of the Thursday afternoon session was devoted to a symposium on labor problems of the hour.

In this symposium, which was carried over into the Thursday evening session, the broader aspects of the situation were discussed with due reference to the rehabilitation of the returned soldier as well as to the present supply of labor.

D. H. McDougall, assistant general manager Toronto (Canada) Power Company and president of the Canadian Electrical Association, gave a very full description of the work being done in Canada in training returned Canadian soldiers. James T. Hutchings, Rochester Railway & Light Company, Rochester, N. Y., told of the "Rochester plan" for helping co-operatively to man the local munition plants without disturbing labor in other manufacturing plants unduly.

Dr. Schuyler S. Wheeler, president Crocker-Wheeler Company, Ampere, N. J., who has but recently returned from France, where he has been making an investigation of the rehabilitation of the blinded soldier, spoke in the evening on that phase of the problem.

Training of Returned Soldiers in Canada

Mr. McDougall said, in his address, that in Canada there was established a hospital commission known as the Military Hospital Commission, which procured hospital accommodations all over the Dominion. This was taken over by the military, and there was established a department to effect soldiers' civil re-establishment.

In considering the demobilization and employment of returned soldiers the men were divided into three classes—men for immediate discharge without pension; men who might be benefited by treatment; men permanently disabled and who could not be helped by treatment.

A system of interviews with returned men was devised. On the first interview the men are divided into two classes: (1) Those not in need of special training because they could go back to former occupations; (2) those in need of special training. Very many men who return are not capable of taking up again their former occupation.

There is in Canada a compulsory vocational training under discipline for all returned soldiers not able to take up former work. There are convalescent courses in the hospitals. In these cases the goods made are sold, the profits from the sale going to the man who made the goods.

A second interview is had with all men ready for occupation. The interviewers are largely returned men. The man is given the choice of an occupation. On the third interview he is enrolled in the proper course in one of the twenty-five schools maintained for this purpose.

There is one important feature in this connection. All men are urged to go in for productive work.

Of the 400,000 men who went from Canada to the battlefield, 35,000 had returned by April. Of these men 1230 had had amputations—520 of the leg above the knee, 320 of the leg below the knee, 259 of the arm above the elbow, 115 of the arm below the elbow. About fifty were blind. Fewer than 10 per cent of those who have returned, or 3356, required special courses.

The address was concluded with a set of lantern slides showing the extent to which Canada is rehabili-

tating the returned soldier. A number of interesting pictures of men actually in training for an occupation were given.

THE ROCHESTER PLAN

Mr. Hutchings, in describing the Rochester plan, spoke in part as follows:

"Owing to the successful and prompt manner in which shrapnel had been supplied under contracts with the English and Russian governments, Rochester was selected as a place to build a complete plant for the manufacture of a famous French gun, two shell plants and a forge shop. Early in August Major Jameson of the Ordnance Department placed himself in touch with the Rochester manufacturers. At a meeting of some fifty of the executive heads of our largest manufacturing plants he outlined to us what has since developed into the 'Rochester plan.' The problem which he outlined and which the Rochester manufacturers agreed to accept as their responsibility was to see that as fast as tools and machinery could be assembled and housed, the necessary men should be forthcoming to man these tools and at no time should there be more than forty-eight hours' delay in putting tools into production after they were ready for the operators. Up to the present time Rochester manufacturers have performed their part.

"A committee was appointed to outline the scope of the work and the method of financing the project. This committee reported on a plan to raise $30,000 to cover the necessary expenses of carrying on the work, and, as it was felt that the principal difficulty would be in securing skilled machinists and tool makers, the first assessment was based upon the payment by each manufacturer of $3 for each skilled metal worker in his employ and 25 cents for every other employee. This plan was immediately adopted and the $30,000 required was underwritten. An executive committee of nine of the principal manufacturers to carry on and supervise the work was appointed. This committee immediately secured the services of a man who had had considerable experience along similar lines to take charge of and establish a central employment bureau which should act as a clearing house between all of the members of the underwriting companies and should be responsible for the supply of the necessary labor for the munition plants, and this bureau operates under the supervision of the executive committee of the underwriters.

"The munition manufacturers were asked to furnish, so far as possible, an exact schedule of the number of men required and the date on which they should be furnished. Through these methods up until about the middle of March, this year, we have been able to supply all of the labor required without interfering in any way with other Rochester manufacturers. But we have now approached the time when the real problem of supplying labor confronts us. We must begin immediately to train the semi-skilled to become skilled, the handy man to become semi-skilled and the common laborer to become handy man, and consider the possibilities of the use of women in industry.

"The total labor requirement for our war industries will amount to 12,000 men. A majority of these have been supplied. We find at the present time there are no skilled tool makers and machinists who are not employed. The problem which confronts us is to obtain the necessary skilled men to man the tools which will very shortly be ready for operation, and to do this the committee was authorized to make an inventory of the men available in all of our Rochester factories and to authorize the employment manager of our central employment office to make a draft equally upon all of the Rochester industries, the method to be pursued being to determine from week to week the requirements and the percentage which these requirements bear to the total men available in the city and to then draw from the various manufacturers in proportion, through the application cards which we have on file, from the help in these various factories. Through this method we will not cripple any individual factory and will still be able to supply the necessary help to the munition manufacturers, and, further, we will place an equal burden on all manufacturers in the matter of training new help through their training schools."

REHABILITATING THE BLIND

Dr. Wheeler, in his address, said that there are some kinds of work that can be done as well by the blind as by those with their sight, and one of these is electric winding. There are now at the Crocker-Wheeler works forty blind men winding coils for armatures and taping at the regular factory piece rates. These men are able to earn a good living, and they rapidly acquire a feeling of independence. No contributions are allowed, for the fundamental idea is that this is not charity work.

Several things must be worked out:

1. The relation of the labor unions to the blind. The unions must know how this activity is going to work out in relation to their interests. They want to know how many blind will be employed.

2. Accident insurance. At one time employers were prevented from taking out accident insurance on the blind operatives. Now, however, insurance companies are writing policies on the blind.

3. Arriving at processes enabling the blind to do factory work. By a little ingenuity in developing devices a great deal can be done for the blind.

In France the Thomson-Houston Company came forward, stating that it appreciated the work now being done at the Crocker-Wheeler plant, and offered to help by opening a room in one of its factories for this work, by telling the societies engaged in training the blind of this work of armature winding, and by telling all of the electrical companies in France that it is going to do this. This company opened a large workroom about ten miles outside of Paris for this work and in a short time became very much satisfied with the work accomplished.

From France Dr. Wheeler went to London to help Sir Arthur Pearson. Conditions there are different from those found in France owing to the close co-operation among English electrical manufacturers through the British Electrical and Allied Manufacturers' Association. This association had a meeting to hear the facts regarding the training of the blind in this work. All of these manufacturers, about thirty of them, then decided to give work to the blind in every job that was of a suitable nature.

Two electrical manufacturing companies in Birmingham, the General Electric and the Siemens, and two more in Manchester, the Westinghouse and one other, sent coils to the shops prior to Dr. Wheeler's arrival and as soon as he got there at once started work.

Patriotic Optimism at the Dinner

P. B. Noyes Shows the Present Status of the National Coal Problem—Samuel Insull Sounds Note of Assurance and Confidence in the Rate Situation

MESSAGES of patriotism and public service, with a word of optimism from Samuel Insull for the outlook in the industry, deeply interested those who attended the dinner at the Hotel Traymore on Thursday evening. It represented the high mark of attendance at the Atlantic City N. E. L. A. war convention and was thoroughly characteristic of the spirit in the industry, in that it was a new consecration of resources to win the war and an expression of faith in the future.

The speakers were P. B. Noyes, director of the conservation division, Federal Fuel Administration; Samuel Insull, director of the Illinois Council of National Defense, president of the Commonwealth Edison Company, Chicago; Dr. S. S. Wheeler, president Crocker-Wheeler Company; Arthur Williams, Federal Food Administrator for New York City, general commercial manager New York Edison Company, and W. W. Freeman, president Union Gas & Electric Company, Cincinnati.

Reports of the addresses, except that of Dr. Wheeler, are published in this article. The remarks of Dr. Wheeler, who told of his work in bringing the blind into industry, are reported in the article on the symposium on labor problems which appears elsewhere in this issue.

President J. W. Lieb, who presided as toastmaster, said that the acceptance of an invitation to a function of this character must be conditioned on the possible call for service elsewhere; and he added that Oscar T. Crosby, Assistant Secretary of the Treasury, had telegraphed expressing very keen regret at inability to be present. An invitation had also been given to Dr. H. A. Garfield. He could not be present. The convention was fortunate, however, in having present one of Dr. Garfield's right-hand men, Mr. Noyes.

Mr. Noyes on the Coal Shortage

Mr. Noyes then spoke in part as follows:

"I would not need the testimony I have seen since coming here with you as to the spirit of this association to say what I have long ago learned, that we have no monopoly of patriotism in Washington. We recognize that there is just as much patriotism in a group like this one assembled here as in any group that could be got together in Washington, no matter who they were, so I shall waste none of your time in a patriotic address, trying to persuade you to do something for the Fuel Administration.

"When I tell people at this time of the year I believe there will be a greater shortage of coal this year than last year, I find that many men are surprised, with eight months before us to prepare for next winter, and they say, why don't you prevent it? As I have studied the problem, there is no other problem that comes to us that could not be solved by American pluck and ingenuity in eight months.

"In the coal business, as most of you realize, we are dealing in a business which has enormous physical proportions. It is beyond anything else that we undertake to do in this country. I made a calculation to illustrate it the other day. The coal movement in the United States is so much larger than the food movement that, for instance, all the wheat that is raised in the country would be moved in twenty-six days of the coal movement. Speaking of the cotton crop, a big crop, with millions of bales, that could be moved in one and one-third days of the time it takes to move the coal supply, at 9 o'clock on the second morning you would have it shipped to its destination. All the grain and the entire crops moved in this country last year, every pound of it, would be moved in fifty-four days, or something less than two months of the coal movement.

Tremendous Increase in Coal Output Necessary

"Now, when you start with that idea that you are dealing with such an enormous physical problem that time must be an element, you realize that our railroads, before this war began, were burdened; you know we were having our embargoes, and there has been very little done since that time to increase railroad facilities until very recently. Last year, 1917, we mined and delivered more than 50,000,000 tons in excess of any previous year. This year our increase indicates that we must mine and distribute 100,000,000 tons more than last year if we are to satisfy all the demands for coal.

"Our figures, as compiled during the last three months, carefully, industry by industry, show requirements of over 80,000,000 tons, and I know, and many of you realize, that we must recognize an increasing demand from week to week. There never is a week goes by that something does not come up that shows us we have not got the whole demand. So we must mine 100,000,000 tons more than we did last year; that is, more than 220,000,000 tons in excess of anything mined before this war.

"That is what the mines must mine, railroads must carry, switch and deliver to destination, more than was mined before on a railroad system that has been very little enlarged; but it must also take care of all of these enormous new supplies, shipbuilding and other supplies.

"Up to the present time the coal shortage has certainly been a railroad problem. We have lost considerable help from lack of work. Many of you know the situation. It is going to be a mixed problem before we get through. It is going to be a labor problem as well as a railroad problem. As I say, we have lost help, and the draft is taking help. If you say we must mine all this coal, yes, you can do it, and you can even get the railroads to carry it if you don't do anything else in the country, but there are all these other things to do. It all goes back to man power, and you have got to spread that man power around, to use it in shipbuilding, furnish so many to the army, and you must devote

its share to improving the railroad facilities, and getting into the mines and getting the coal out. The problem we have is to meet an increase of 100,000,000 tons, and we can't make it. If we make half of it, we will do well.

"Now, what is the answer? There are two. The first, of course, and the obvious one, is to save all we can. Fortunately this country has been a very extravagant and wasteful country. Coal has been so

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P. B. NOYES

cheap for manufacturing interests—I won't say the utilities, because that is their raw material—only 2½ per cent, or in some cases only 1 per cent, of the cost in coal so they haven't given any attention to it.

"The second is the great question of economy of power, of getting the benefit of the power we do make by fuel, and by other means, such as water, oil and so on, and getting all we can out of it. Then there are the other avenues of waste, as the householder, and the waste of light, all of those, in six divisions, we are attacking. But to save anything like 100,000,000 tons, as you all know, or even 50,000,000 tons, is something that we get up our enthusiasm and say we are going to do, but if your life depended on it, you would say, 'Well, that is on paper,' and we had better look around to some other life preserver, rather than to depend on it.

"There also comes in it the other safety valve, which is curtailment. Now, curtailment of industry, which is the place where curtailment has to come, is almost as serious as not having shell steel. The only standard you can make is war and non-war. Now, it is easy to understand, if we are going to have a shortage, it is certainly coming out of the non-war.

"We have probably 10,000,000 men, probably $20,000,000,000 worth of capital that is almost as important as the shell steel to the success of the war, to say nothing of the economic life of our country, to say nothing of after the war, so that I tell people to not always be saying a ton of coal means so many ships and means so many shells. Get your eye on the other end; a ton of coal in many places means a hundred people kept at work, every ton of coal you can save anywhere will keep at least fifty people at work.

"We have no right to put the utility people on the Table A list, and be sure that they get 100 per cent coal, if 60 per cent of their power is non-war, unless they are a part of the Fuel Administration, and the other 40 per cent is handled as we would handle it. In other words, as I said to the steel people, there is no way to try to give you 80 per cent or 60 per cent of your coal. The first thing to do is to make the steel business a war industry, a 100 per cent, and then be sure it has 100 per cent coal. Now we want to make the utility business a 100 per cent war business in the double sense. Now that means that you have got to act for us on the remaining 10, 20, 30 or 40 per cent, which does not belong to any of the war needs.

"We have got to police the distribution of all the coal that can be saved from war industries. I have told the people down in Washington when we get to the district where there is only enough coal for war industries, and not a ton for anything else, we have got to be brave enough to face it, and say we are going to furnish the other industries some. If we have districts in which there is not enough coal for the war industries or any to spare, we have got to take a certain portion of that away from war and spread it around just enough to prevent disaster. Now, somebody has got to divide that, got to put it where it will do the most economic good, and you have got that same delicate problem of dividing your power, because it is not going to be fair for us to say to an umbrella man, you are only allowed your share of 70 per cent, whatever it is, and the other umbrella man alongside of him gets his power from the public utilities, which get 100 per cent.

"In other words, we have got to get close enough to you and you have got to get close enough to our problems so that we are just as safe in your hands, not only in the economical making of the power, but in the

ARTHUR WILLIAMS

distribution of it first to war industries, and second what is left along similar lines to those on which we are distributing coal, so that it will preserve this country from economic disaster."

INSULL SPEAKS WITH OPTIMISM

In introducing Samuel Insull, President Lieb said that there are many lines of activity and many directions in which people permanently identified with the

industries can and do co-operate with the government to solve the stupendous problems which are before us.

Mr. Insull said in part:

"I have been sitting listening to some of the speeches delivered to-day at our convention meetings, and I must say that a note of despair has run through some of the speeches delivered, a note which I question to be justified by the conditions existing so far as the effect of the war on our business is concerned.

"While every article making up the cost of our product is either directly or indirectly governed as to price by federal action, our selling price of our product has remained more or less stationary, but I do not agree with some of the statements made to-day to the effect that we are getting little or no relief so far as selling price is concerned. In some states the wording of the laws creating commissions is somewhat ambiguous so far as increasing prices is concerned, but as a rule the laws creating commissions in the various states leave with the commissioners the authority to increase or decrease price as necessity may arise.

"In some states we are unfortunate enough to be still operating under conditions where our maximum price is governed absolutely by municipal ordinance, but in a few cases it has been found possible to create local sentiment of a sufficient and enlightened character to result in relief from your maximum prices and an increase in the selling price of our product proportionate with the increase in our cost. We certainly have no reason, and I am speaking alone of the electric light and power portion of the public service industry because I am addressing an audience that is particularly engaged in the electric light and power business, to complain of the course taken by most of the commissions governing our business in most of the states.

"It has been authoritatively stated that of the 460 applications made for increased rates in the year 1917, upward of 400 decisions were given favorable to an increase in the selling price of the applicant appearing before those commissions, and there are but few cases that have been presented to the commissions during the first half of 1918 where some relief has not been granted.

"Our fundamental trouble is a financial trouble. It deals largely with the refunding of maturing securities and the placing of new securities for necessary capital expenditures made during the last year. We cannot expect investment bankers and investors to have confidence in our securities unless we display a confidence and belief in the earning capacity of our own business.

"The note that I wish to sound here is not one of lament that our balance sheets are not showing up satisfactorily, but it is a note of assurance. With labor increasing in cost largely as a result of federal action in addition to the ordinary laws of supply and demand, with the cost of fuel increasing partly as the result of governmental action and partly as the result of the operation of the laws of supply and demand, with freight rates increasing entirely as the result of governmental action, and with the prices of all commodities used in our business increasing as the result of the increase of cost of labor and the increase in the cost of transportation, it does not seem possible in this day and generation that we can contemplate the possibility of our selling price remaining stationary. And the experience with those of us who have appealed to the properly constituted authorities to deal with the question of our rates gives me every confidence that if we are diligent in the presentation of our situation to those properly constituted authorities, we are bound to get relief. And as a result of that we ourselves will regain confidence in the remunerative character of our business, and if we can pass that confidence on to the investment banker and to the investment public, if we are willing to pay the price we must necessarily put up in war times for money, we should not have more than the ordinary difficulty of all classes of business in time of war in providing for new capital and a refunding of outstanding securities.

"We will get some benefit from the action of the Fuel Administration in connection with our business. True,

W. W. FREEMAN

we have had to take the benefits with the disadvantages —the disadvantages consequent upon war conditions. Every order, with few exceptions, issued by Dr. Garfield's department has had a tendency to reduce our load factor, and consequently to reduce the earning capacity of our business on the dollar invested. The first orders as to signs, while in my judgment of great advantage nationally because that order performed a great educational service in teaching our people that sacrifices were ahead of them as the result of war, affected our own earning capacity out of all proportion to the saving obtained. But if it had been my privilege to occupy Dr. Garfield's position, I think I would have issued that order just the same, as I believe that it was part of the educational campaign, the patriotic propaganda for bringing home to the people of the United States the duties that they had to perform and the sacrifices they had to make in connection with this war.

"An advantage that we obtained from some of Dr. Garfield's orders was that in connection with the advice for production of energy massed, and that isolated plants should be dispensed with as much as possible, and that large distribution systems should be connected up so as to get whatever advantage there is from the differences in diversity of load between one system and the other.

"It was rather refreshing to some of us that Dr. Garfield in his first order should have quoted the course being taken in England, and that was taken as a result of the investigation of a committee presided over by

our friend Charles Merz, who is consulting engineer for some of our companies on this side, and who to a very large extent got his ideas as to the course which should be pursued in connection with such matters from the experience he had gained from the massing of production and the centralization of distributing systems in the United States.

"To some of us who have been engaged for years in pointing out the true economics of our companies, and who have had to reply to the claims of the politicians that we were engaged in building up great power trusts, it was rather a pleasure to have the assistance of the federal Fuel Administrator in urging that the very things that we have been doing on quite a large scale in different parts of the United States should be adopted as a universal rule so far as it is possible, when such a course could be adopted. (Applause.)

"Now, there are other advantages we have gained as the result of the increased cost of our product. We have learned to do away with a lot of unnecessary expenditures, both of a capital character and of an operating character. Our business has grown with such tremendous rapidity during the last quarter of a century that those who thought we were operating the most economically have fallen into practices not at all required under the orders of various regulating bodies, but adopted largely by us to foster the getting of additional business, and we have indulged in those extravagances which, at a time like the present, when operating expenses must be watched to the limit, we have been able to dispense with. And we have been able to compensate to some extent for the losses that have been brought upon us as the result of the increased cost of labor and material.

"But we are not here to-day to look into our balance sheets so much as we are to look into matters in which we can be of real help to the government in the operation of the war.

"Now, it does seem to me that such a body of men owe a particular responsibility to the government in a time like the present. It should not need any persuasion, judging from the experience we had last winter, to prevail on an electric light and power man to store fuel. It should not need any persuasion to get him to see that his employees store fuel. It should not need any persuasion for him to see to it that the community in which he lives, either as a community or as individual manufacturers or householders, store fuel.

"But there are a great many things in addition that we can do that will be of great assistance to the government and will greatly assist in the movement of fuel and the correcting of the trouble that the union as a whole suffers from in the shortage of production.

"I do not know that I absolutely agree with the previous speaker as to the causes of the present shortage of fuel. I make that statement with some trepidation, because my experience is confined to the State of Illinois, but I do know at the present time that the miners of the State of Illinois are not working more than 60 per cent of the time. I do know that that is not owing to the action of the miners themselves or of the operators of the mines. I do know that it is owing to the shortage of open top equipment for the purpose of carrying fuel. I know that such portion of the open top equipment as is applied to the carrying of coal can carry during the summer months an infinitely greater tonnage than is possible to carry with the same equipment in the winter months, owing to the difference in the capacity of the motive power to haul a given tonnage of coal as between the winter and summer conditions.

"There is no time and there is no capacity to manufacture new equipment. It is a case of bringing that equipment from unnecessary uses, if Mr. Noyes will excuse my using that word, and employing it in the most essential uses, namely, to provide the fuel for the purpose of moving the wheels of industry and of commerce.

"If you will, all of you, turn around and adopt the resolutions which the association adopted this afternoon, as your individual resolve, if you will see that the war activities in the communities in which you live are influenced by you in the right direction, if, in short, you will use your influence to so steer things that unnecessary local improvements will be abandoned, that the erection of unnecessary public buildings will be abandoned, that the building of club houses and places of amusement that can be held over until this war is over are abandoned, you will be going a long way to help yourselves to get fuel. And unless we get fuel in this country the government is going to be tremendously handicapped in all of its war operations." (Applause.)

MR. WILLIAMS ON FOOD CONSERVATION

Arthur Williams discussed the Food Administration law and the general lines of effort followed by Mr. Hoover. He said that the large results obtained have been secured through patriotic co-operation by the people of all sections.

MR. FREEMAN ON "SERVICE FIRST"

W. W. Freeman spoke briefly, saying:

"One thought only occurs to me and that has been suggested by one of the early speakers, Mr. Noyes, in his perfectly proper criticism of the slogan 'Safety first,' in which we all concur. It does seem to me, however, that we have had, some of us at least, in our industry another slogan that we have been trying to use, to which that same criticism might not apply, and that is the slogan 'Service first.' It has perhaps had a narrow application in its inception and in the use to which it has been applied.

"The initial thought, doubtless, was to get the public to think that, after all, service was of greater importance than cost.

"It seems to me, Mr. President, that this is both the most serious and the most inspiring convention this association has ever held, serious because we have never met under conditions that are as crucial as the conditions under which we are now met, and inspiring because we have been brought to a true realization of these conditions. We are not going to fool ourselves as to the fact, but we realize what these conditions involve in their obligations upon us, and if we respond, as I believe we are prepared to respond, to this call for service, for sacrificial service, as may be required, for service not confined to the narrow limitations of our own communities, but service which reaches out beyond these limitations, beyond even the limitations of our own nation, out to the call of humanity for sacrifice, service necessary on the part of each one, that we may be inspired in the belief, in the conviction that this service will lead to assured victory."

War-Time Engineering Problems

N. E. L. A. Considers Problems Imposed on Public Utilities by War and Outlines Some Methods Which Have Been Adopted to Solve Them

ENGINEERING problems with which the central-station industry has been confronted since the war and methods of solving them were discussed by the Technical Section of the N. E. L. A. at Atlantic City yesterday morning. Among the specific subjects considered were the following: (1) Increasing cable-carrying capacity; (2) reinstallation of old cables; (3) use of aerial cable where overhead wires are prohibited and underground construction too expensive; (4) coping with the scarcity of labor in meter departments, and (5) increasing the output of existing apparatus.

The development of water power as a war measure was also discussed.

SOLVING DISTRIBUTION PROBLEMS

Increasing Dissipation of Heat from Cables—Utilizing Old Cable—Use of Aerial Cables

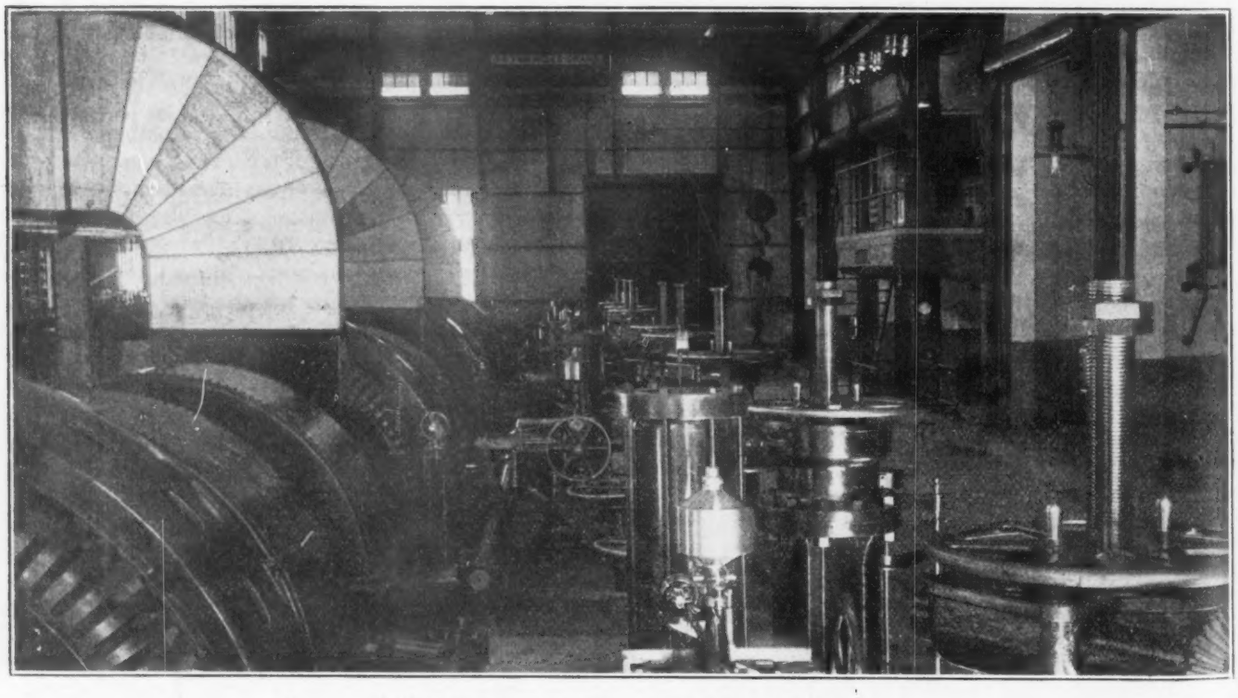
The heating and carrying capacity of cables is of exceptional interest at this time, when maximum use must be made of equipment and interruptions of service to war industries must be avoided. Experience has demonstrated that underground cables ordinarily have lower current-carrying capacity during the summer than in the winter, said E. B. Meyer, chairman of the underground committee of the N. E. L. A. Failure to recognize this fact has resulted in many cable breakdowns with consequent service interruptions. To prevent undue operating expense and service interruptions on the one hand and yet permit full utilization of the underground conductors on the other it is important that the rating of cables be known as closely as possible.

Various methods have been tried in a somewhat restricted way to increase the capacity of such cables, particularly during hot, dry seasons. Among them are cooling by the circulation of air through the cable ducts, circulation of water around the cable, hydration of the surrounding soil and immersion of the cables in materials which conduct away the heat readily.

The difficulty of obtaining material on short-time delivery, the speed with which installations have to be made at the present time and the need of conserving funds makes it imperative that all central-station equipment be utilized to the maximum. With this idea in mind some companies have adopted the practice of removing cable from certain sections of the system where load conditions have changed and reinstalling the same cable in other sections of the system where reinforcements are necessary.

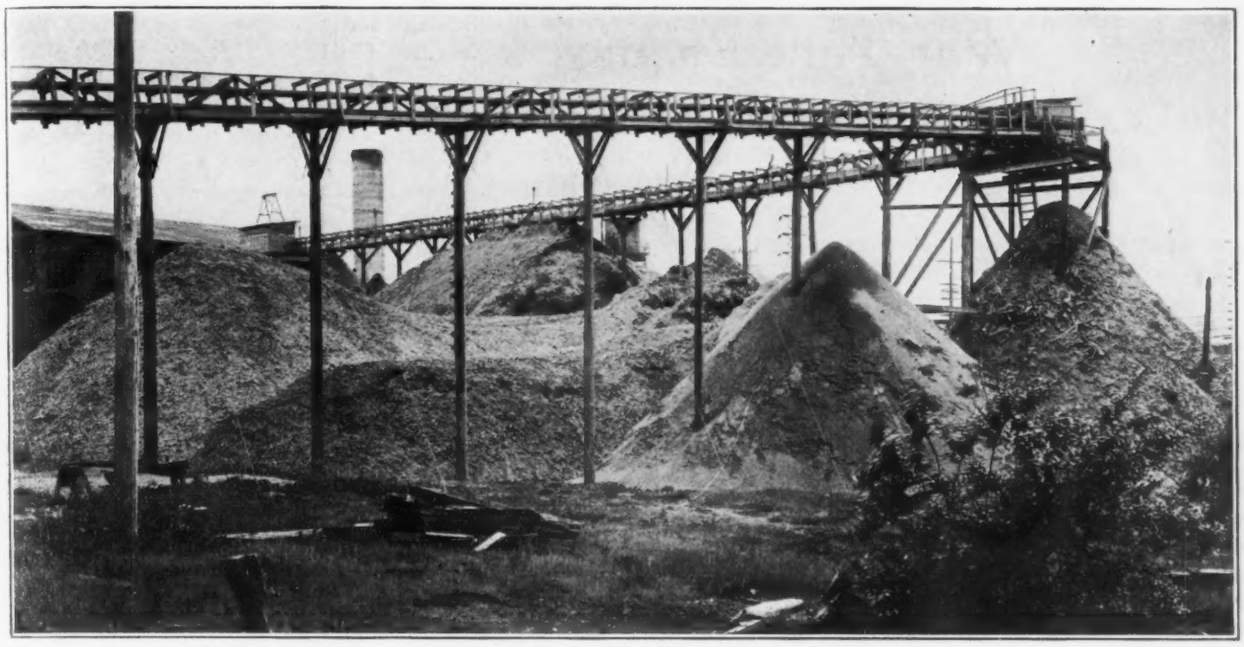
Aerial Cables for War Industries

On account of the large power demands imposed upon central-station companies for furnishing service to war industries, a number of operating problems have developed which have made it necessary to devise special methods of construction to serve the industries upon which the government is depending to help win the war. The matter of giving primary service to the customer has been taken care of by one company with a



INCREASING THE OUTPUT OF EXISTING APPARATUS

By forcing air from the tailrace through the generator windings the 8500-kw. units in the Stanislaus hydroelectric station can be made to carry 10,000 kw.



USING SHAVINGS AND SAWDUST FOR FUEL

Oil is scarce on the Pacific Coast, so during low-water periods one of the hydroelectric companies will use wood refuse for fuel in its auxiliary steam station.

special form of aerial cable supported by messenger wire similar to that used in telephone work.

In early installations ordinary lead-covered cable was used, but the excessive weight of this type of cable made it necessary to provide short pole spacing. Recently, however, the use of lead-covered cable has been abandoned in favor of a cable having a reinforced rubber jacket which is considerably lighter and allows installations to be made on standard pole line construction. The cable is designed for operation at 13,200 volts and is made up of paper insulation over the individual conductors with a paper jacket and a final covering of reinforced rubber, over which is applied a galvanized-steel tape for mechanical protection.

One of the advantages of aerial cable construction is that the cable may be installed on pole lines without any changes whatever in the existing construction. Two or more cables may be installed and changes or repairs made on the circuits without taking out of service any line except the one on which the actual work is being done.

The aerial cable construction is, of course, used only in special cases where it is desirable to cross underneath highway or railroad bridges and where open wire would be undesirable and underground construction costs prohibitive. The construction is somewhat more expensive than an open-wire line, but costs considerably less than an underground conduit system.

MAKING CABLE CONNECTORS FROM FLAT-BAR COPPER

At present, when the manufacturing plants of the country are working to full capacity turning out munitions and delivery of other material is uncertain, utility companies have found it desirable to make their own copper sleeves as required and at the same time effect a saving.

Bar copper, usually end pieces ordinarily junked by station construction forces, is selected equal in thickness to the wall of the sleeve to be made and cut into rectangular pieces as long as the sleeve and with a width equal to its circumference. Each piece is heated and bent around a mandrel just large enough to allow the ends to meet at the inner edge of the copper. Then the sleeve is run through a copper saw to clear away the surplus metal, after which it is hammered to size around a mandrel equal in diameter to the required bore. The solder slot is made on a milling machine or copper saw, depending on the size and type of sleeve.

LABOR SCARCITY IN METER SHOP

Two Methods of Relief—Employment of Women and Extension of Test Periods

Since the war commenced many meter departments have been handicapped by losing the young men who had been engaged for testing meters, said E. S. Mansfield, Edison Electric Illuminating Company of Boston, in presenting the report of the meter committee. As many as 50 per cent have left either to enter the country's service or engage in more lucrative employment. Older men cannot be employed, as they demand too high wages, so only two courses lay open to the solution—employment of women and extension of test periods.

Out of thirteen companies questioned three employ women in their laboratories. In one company they range between twenty and twenty-eight years in age and are required to have a grammar-school education. Electrical knowledge is not necessary, but some evidences of thoroughness in anything undertaken are essential. The women are trained by stationing them at the test benches as assistants to the regular testers and allowing them to absorb methods by watching. Educational courses are also given as to the requirements and best methods of doing the work. One difficulty experienced in central-station meter departments which does not exist in manufacturing plants is that each tester has to handle several different types of meters. Nevertheless, the women that have been employd in meter laboratories have in most cases been

found as satisfactory as men, and they are more contented to continue at this kind of work. No women are employed on routine system testing, but they may be employed later on small meters.

Extension of meter testing periods, as mentioned before, has also been adopted by some companies, the period between tests being six to twelve months except for high-tension or very large meters. This method of coping with the labor situation is being allowed in New York until conditions become normal again.

INCREASING EQUIPMENT RATING

Use of Forced Ventilation Where Not Already Used —Change from Delta-Delta to Y-Delta

Various methods which have been employed by operating companies to increase the output of existing equipment were cited by H. C. Albrecht of the Philadelphia Electric Company in presenting the report of the N. E. L. A. electrical apparatus committee. In the Northwest, for example, one company was able to increase the rating of two 10,000-kw. water turbine-driven generators to 14,000 kw. (continuous rating) at a cost of only $1,000 by merely providing forced ventilation. No difficulty was experienced on the turbine end because the prime movers were rated at 21,000 hp. each. To provide the forced ventilation the generators were inclosed above the floor line, a duct connected with the space over the tailrace and blowers installed to force air along the periphery of the stator laminations. Ordinary water sprinklers were installed in the duct from which air was drawn to cool and humidify the air further. Later it was made possible to develop 16,300 kw. continuously with each machine by re-insulating the windings with material that would withstand higher temperatures. If other companies having generators driven by overrated prime movers and not employing forced ventilation do likewise, they too may benefit, suggests the committee.

Some companies have changed from delta-delta connections to Y-delta to permit carrying larger loads with existing equipment, while others have relied on load dispatching to secure the maximum use from equipment. Transferring apparatus to a place where it can be used more efficiently has also benefited some companies. On a Southern system where a rotary serving a three-wire system was damaged so it could not be used, the company avoided a prolonged interruption of service by transferring a railway rotary to the station and reconnecting it and the transformers to give the desired voltage.

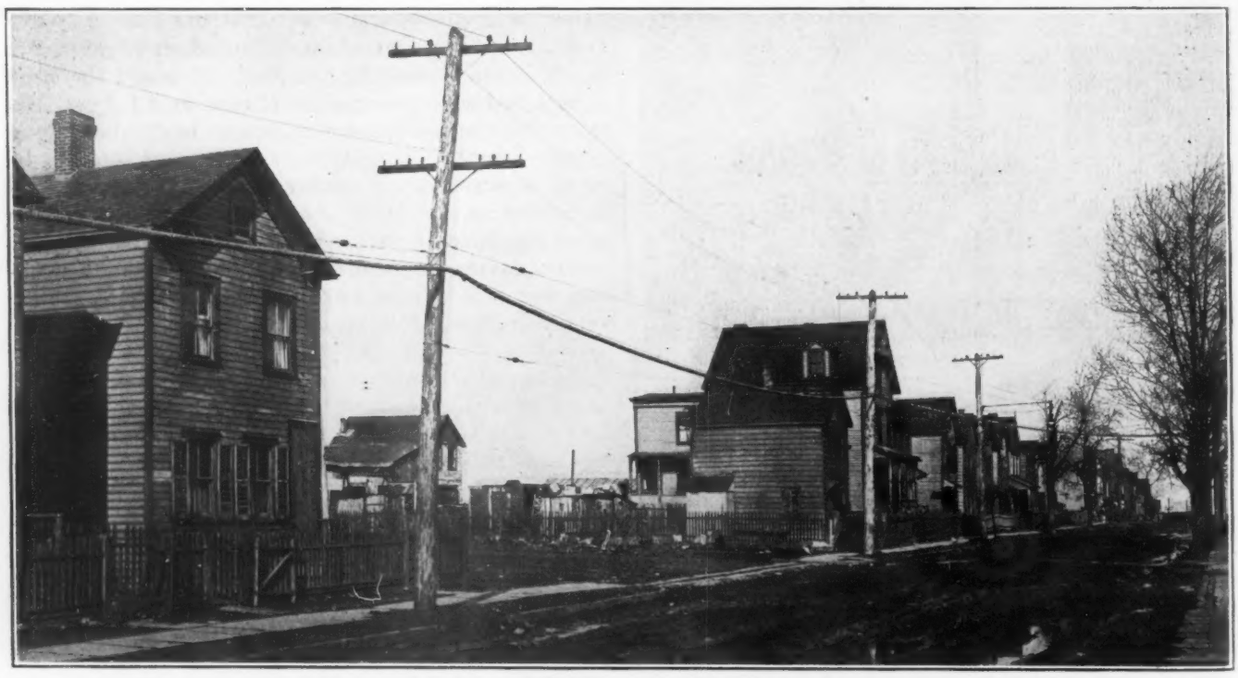
WOMEN AS SUBSTATION OPERATORS

Steps that Boston Company Has Taken to Train Women for Work in Substations

Realizing when this country was drawn into the war that men would be scarce, the Boston Edison company started in a small way to train women for certain occupations hitherto filled by men, E. S. Mansfield pointed out. Since then it has equipped them to perform the work necessary in substations, about fifteen now being thus employed.

The women were not obtained through labor bureaus or in the usual ways in which help is employed. Instead, the company asked post office representatives, druggists, etc., in different towns which it served, for the names of young women who would be likely to undertake patriotic service. At first the women were instructed in the fundamentals of electricity, but later they were put directly in the substations after having received general instructions. This was done because it was found that the women who ranked the highest in laboratory work were poorest in actual substation operation.

The general instruction course lasts about four weeks.



RUNNING CABLES ON EXISTING POLE LINES

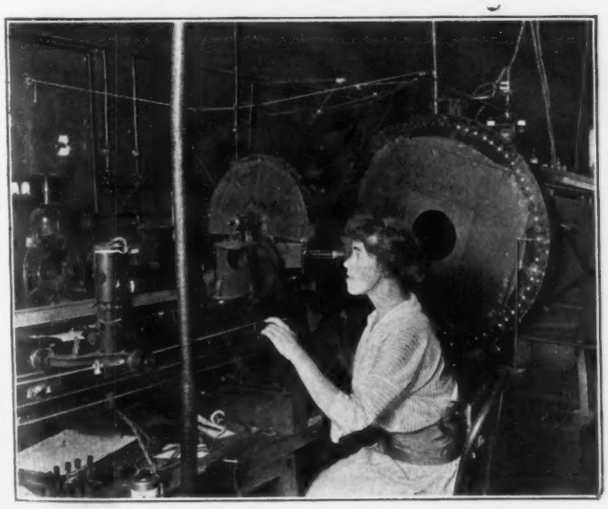
In emergencies one cannot wait to install underground ducts for cables, especially when there is a pole line available. Besides an overhead cable can carry more current.

WATER UTILIZATION MEANS COAL CONSERVATION

A proper development of water power with suitable interconnections with steam stations where necessary would result in great savings of coal, labor and transportation.

Then, in the substations, under supervision of the regular male operators, the women are trained in their ultimate duties. Eighteen women were trained in this way. The shifts are eight hours long and are rotated at regular periods so that no woman will have to work the same hours all the time. After receiving their training the women are examined and a rank is given them. Two work on a shift without any man in supervision.

During the instruction period they are paid the same amount as later when in actual service; that is, $15.40



WOMEN HAVE A PLACE IN THE ELECTRICAL INDUSTRY

a week at the start. The women can earn as much as the men, the amount depending on their ability. Quickness to act in an emergency, lack of nervousness, ability to act without instruction and similar qualifications are the requirements on which they are judged to a great extent. Of the eighteen women trained, fifteen qualified and have been found quite satisfactory.

On account of the importance of this subject, Mr. Vanderpool of the Public Service Electric Company of New Jersey recommended that a committee be appointed to consider the problem.

WATER-POWER DEVELOPMENT AN EVER-INCREASING NEED

How 6,000,000 Tons of Coal May Be Saved in Twelve Months, in Addition to Labor and Transportation

For a year or more, said W. W. Nichols, Allis-Chalmers Company, Milwaukee, Wis., he had been impressed that the use of water power was possible as a war measure. Certain steps, however, have been necessary.

The common conception of water-power development would induce the thought that the application now is under high pressure and that, time being now the desideratum, this development is impossible. On the contrary, there are many different kinds of water-power development.

Moreover, there is the fact that the Fuel Administrator has just reported an estimated shortage of 80,000,000 tons of coal for the year. It would therefore appear that some practical relief outside of the coal field is imperative. Here water power lends itself to a limited extent. The year 1917 was one of inferior demand in water-power machinery, yet 1,058,000 hp. of hydroelectric machinery was built and installed. This alone represents a saving of 8,500,000 tons of coal, besides a saving in production labor and transportation. Ten per cent of the estimated coal shortage of this year therefore would be met if the industry could do as well this year.

Without building new plants there are two ways of hydroelectric development: (1) By increasing the capacity of plants already built. In this connection it has been estimated that 300,000 hp. can be developed in the next twelve months by central stations.

(2) Replacement of machinery installed prior to 1911. This would take care of an increased horsepower of 450,000.

By these means 6,000,000 tons of coal would be saved in the twelve months in addition to labor and transportation.

Power is now more than ever fundamental to our existence. The power shortage is a national calamity, calling for a broad national treatment.

The Electric Vehicle as a War Measure

Abundant Evidence That the Storage Battery Commercial and Industrial Trucks Are Taking a Prominent Part in Present-Day Transportation as the Result of Situation Demanding Development in Haulage Methods

WHILE but one paper was presented at the Electric Vehicle Section meeting—that by James H. McGraw, president of the McGraw-Hill Company, Inc., New York—the situation that now exists in the field for storage-battery-propelled vehicles was fully outlined. The paper and discussion were decidedly progressive, and gave every indication that those interested in the development of this field felt that the electric vehicle had come into its own and that the field for this means of transportation offered immense possibilities. The war has changed normal conditions, and now the electric vehicle in its commercial and industrial uses is a necessity.

ELECTRIC VEHICLE SECTION ELECTION

The following officers were elected by the Electric Vehicle Section of the N. E. L. A. for the ensuing year:

Chairman—E. S. Mansfield.

Vice-chairman—G. E. Foster.

Treasurer—H. M. Edwards.

Secretary—A. J. Marshall.

Executive Committee—J. H. McGraw, P. D. Wagoner, H. G. Thompson, E. B. Chalfont, Charles Blizzard, W. W. Freeman, L. Ward and T. I. Jones.

ELECTRICITY AN AID TO WAR TRANSPORTATION

What might almost be termed a symposium on the present status of the storage-battery truck was contained in Mr. McGraw's paper, "The Electric Vehicle as a War Measure,"

After outlining briefly the general situation and the facts that give a sharper picture of transportation conditions, the question of how electricity can help was considered carefully. In this connection there are three means of auxiliary aid to the railroad freight problem: (1) By hoists and transfer cranes and platforms; (2) by the industrial electric truck, which is being used in large numbers, and (3) by the commercial electric truck for local short-haul, many-stop deliveries. All of these are now performing a distinct war service.

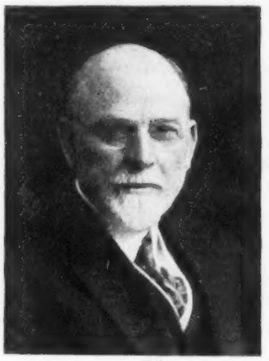
The extensive application of electric industrial trucks in government war work, together with the saving resulting, were given special attention. Of these trucks it is estimated that there are 5000 in use to-day.

One of the biggest parts of the present transportation problem is the inefficiency of handling goods at terminals and from there to warehouses. In the solution of this problem by the electric vehicle lies a large opportunity for the central station and the manufacturer.

Electric industrial trucks, by conserving man power, speeding up production, and in other ways, have revolutionized the methods of handling goods in many munition factories and arsenals.

The local delivery problem, which has been the subject of national investigation, offers many opportunities to the electric vehicle. The high costs of local delivery service that now obtain are sufficient evidence of the wastage incurred by other than truck delivery. The short-haul, many-stop deliveries provide the field for the electric truck. Another example of the present opportunity is in fuel handling.

The general advantage of the "electric" in this industrial and commercial work lies in the simplicity of manufacture and of operation, in the small amount of maintenance required, and in its very low operating cost.



JAMES H. McGRAW

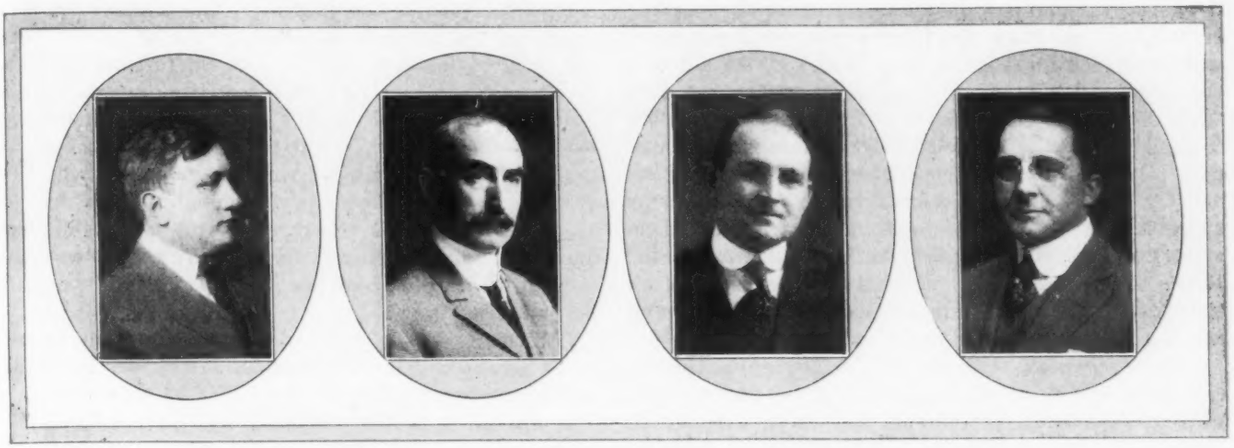
The experience abroad with the electric vehicle was briefly touched upon, and in closing attention was once more called to the opportunity of the central station to promote this activity as an economical solution for an important part of our big transportation problem.

"The supply of electricity," Mr. McGraw said, "for the big developments to come in cheapening the cost of handling goods in terminals and warehouses, and in cutting the cost of deliveries on our city streets, is worth the attention of every central station."

Discussion

In opening the discussion John W. Lieb pointed out that the electric truck is coming into its own, a situation which has been brought about by our national economies. The key to the solution of the release and clearing up of terminal congestion lies in the electric vehicle.

A number of others spoke, all adding a note of optimism and indicating unreservedly their belief that here lies a real opportunity for the central station. The point, however, of the necessity for adequate garage and repair facilities was most strongly emphasized. Those who participated in the discussion were C. K. Chapin, Memphis; F. W. Smith, New York; P. D. Wagoner, Long Island City, and F. D. Pembleton, Newark, N. J.



LEFT TO RIGHT—P. S. MILLAR, R. R. YOUNG, J. G. LEARNED, T. I. JONES
Leaders in the Discussion on Commercial Section Subjects

Commercial Economics Due to the War

Factors Involved in Lighting Curtailment, Equalization of Peak Loads, Appliance Sales Stimulation and Utility Co-operation in the Sale of War Securities Occupy Attention of Commercial Session

HOW to utilize existing equipment to the best advantage and give good service was the common theme running through the papers and discussion of the Commercial Section's session on Friday afternoon. From the discussion of those participating, though somewhat limited for time, it was apparent that the electric lighting commercial men are alive to the situation.

The report of the nominating committee was presented by Thomas F. Kelly and provided for the following officers, who were elected:

Chairman, C. J. Russell, Philadelphia; vice-chairmen, John G. Learned, Chicago, and M. A. Seelman, Brooklyn; secretary, Henry Harris, Pittsburgh; executive committee, terms expiring in 1919, F. H. Gale, James R. Strong, Thomas F. Kelly, H. R. King, R. H. Tillman and E. A. Edkins; terms expiring in 1910, M. O. Dell Plain, C. E. Michel, F. D. Pembleton and A. A. Pope; terms expiring in 1921, Oliver R. Hogue, S. M. Kennedy, J. C. McQuiston and W. H. Hodge.

Economics of Lighting Curtailment

Owing to the changes in quality of coal and other complications the effect that lighting curtailment has had on consumption of coal cannot be easily estimated. Even if it were definitely known, it would be found negligible, said Preston S. Millar, in his paper on this subject. Nevertheless, the psychological effect may be good.

Measures adopted for the national interest ought to encourage elimination of waste, since a great saving can be realized by inducing the public to turn off lamps when not in use. The speaker said that he does not believe the stoppage of carbon and gem lamp manufacture is advisable at this time, because rugged lamps are needed for certain service. In some places, however, more tungsten lamps can be substituted for the less economical kinds.

More lighting is needed in many places to increase production and protect the public. Several curves were shown indicating the effect of daylight saving on residential loads.

Peak Equalization

A plan to reduce and equalize the peak load in winter months was outlined in a paper prepared by R. R. Young, Public Service Electric Company, Newark, N. J.

The territory is divided into two zones, a northern and a southern zone. During November last the cooperation of all manufacturers using 50 hp. or more was asked in the redistribution of the load.

The power representatives went out to their assignments and daily made reports. All came together once a week for a meeting to discuss progress and developments.

No provision is made in the company's rate for off-peak power. All that the manufacturer received was a reduction of his demand on the peak and the consequent assurance of greater reliability of service.

The total load was 184,200 kw., of which the relief promised amounted to 16,416 kw., or 8.9 per cent. In the northern zone the actual results showed a saving on the peak load of 10,000 kw., while the peak occurred in November. Besides there was no curtailment of energy consumption.

In the discussion D. H. McDougall, Toronto, said that the daily load factor of his company had advanced from 60 per cent in 1915 to 97 per cent at the present time. A total of 40,000 hp. of off-peak load has been taken on, nearly all of which was the result of an educational process by the company's engineers in manufacturing plants. Now the off-peak development has reached its maximum and the company can take on no more of it. A much larger revenue per plant horsepower is now being derived as a direct result.

Messrs. Dell Plain and Harris entered the discussion, the former pointing out that he had experienced little difficulty in getting large consumers to shift the peak.

The course planned by the Public Service Company of Northern Illinois to meet the exigencies of the times was briefly outlined by John G. Learned, assistant to the vice-presidents of the company, under the title "Stimulating Appliance Sales." In this connection the company is making a special effort to obtain more business from the domestic consumer. Additional outlets are urged, more appliances are being sold to customers, and those owning appliances are encouraged to use them more. Because of the depletion by the army of the sales force the company has enlisted the services of all other employees by offering a 5 per cent commission on appliance sales outside of business hours.

The author suggested that now is opportune time to encourage wiring contractors, department stores, hardware dealers and other merchants either directly or through the manufacturers of appliances to engage in the sales of appliances, since the greater the number sold the greater the income to the utility.

In concluding the paper the author spoke of the importance of increasing as far as possible the wattage of customers' lighting installations. He said: "Lamp prices should be adjusted so as to encourage the customer to use either 50 or 60-watt lamps, preferably the latter, by establishing a lower price for that particular lamp. The increased wattage will be reflected in the increased gross income."

Chairman Edkins, in discussion, mentioned that manufacturers of appliances expect to do 40 to 50 per cent more business this year than ever before. Every central station, he stated, can improve its load by developing appliance business.

H. W. Peck, Schenectady, told of selling at list 150 washing machines in twenty-two days in November and more than 100 vacuum cleaners during the Christmas holidays last year in a city of 100,000 population. The net profit in appliance merchandising has helped to reduce materially the expense of the selling department.

J. E. Davidson, Omaha, Neb., told of how he took advantage of the shortage of domestic labor in his advertising and sales solicitation, thereby boosting sales considerably. In the past year and a half sales have been at the rate of $225,000 a year by his property, which prior to this time did no merchandising.

Messrs. Dell Plain, Pembleton, Peck and Chapin contributed largely to the discussion.

Selling Government Securities

The activities of the Brooklyn Edison company in assisting the government's sale of its war-time securities—*i.e.*, thrift stamps, war savings stamps and Liberty bonds—were described by T. I. Jones. The paper showed how a public utility may utilize its commercial force in time of war to arouse public interest and obtain public help in raising the necessary money to defray the expenses of the war.

There are two methods which a public utility has of selling government securities—one to its employees and the other through them.

The campaigns described in this paper for war savings stamps and Liberty bonds were carefully worked out, and the entire sales force of the company was used for patriotic service. Company business was subordinate. Advertising and follow-up methods were devised and given as much attention as if they were business campaigns vital to the success of the company. Every salesman was assigned to work the major part of each day, and during some periods the entire time of salesmen was devoted to the work. A written report was required of each call. Frequent meetings of the men were held for inspiration, co-operation and assistance. A daily report was written giving the name of each individual in the sales department and the result of his efforts. Copies of this report were sent to each district manager and bureau head, and an active rivalry was fostered in which each used his utmost energy to make the best showing.

Chairman Edkins directed special attention to the great service which the companies can render in selling government securities.

In discussion of this subject Henry Harris, Frank W. Smith and Frank H. Gale showed what companies and employees can do.

PAST-PRESIDENT W. H. BLOOD, JR.

Accounting Section

Toward the close of the Friday afternoon session the Accounting Section convened for the consideration of two papers, one on accounting practices and the other on accounting education. The limitations of time prevented discussion other than the reading of the papers.

Accounting Practices

The paper by William Schmidt, Jr., Baltimore, on "Radical Accounting Practices," emphasized a number of advantages and economies obtained with various accounting practices and referred to the increasing use of women for this work.

Accounting Education

Owing to conditions of labor turnover the subject of specialized training has assumed a new importance, it was pointed out by Fred R. Jenkins, Chicago. This education, as applied to public utility accounting, has been taken up by the N. E. L. A. Accounting Section and a number of courses have been developed and are now in active use. These courses were described briefly, and in closing the author urged member companies to take full advantage of them for training purposes.

EMERGENCY CONSTRUCTION FOR THE WAR DEPARTMENT

Colonel Junkersfeld Reviews the Part of the Cantonment Division and the Rapidity with Which Work Was Completed

At the Friday night session of the N. E. L. A. an interesting account with lantern slides was given by Col. Peter Junkersfeld of the work of cantonment construction. How these great army centers grew up as it were over night is now a matter of history, and

COL. PETER JUNKERSFELD

the part played by public utilities in serving them was outlined by Col. Junkersfeld to the edification of the convention.

Through its investigations, the Council of National Defense determined that the matter of housing the armies to be called into service, if left to the then overloaded existing military organization, would unnecessarily hinder the development of the military resources as distinguished from problems which might be solved by the civilian body. The Secretary of War, recognizing the cogency of this fact, called to his aid a body of civilians, known to be successful and experienced in the character of construction work needed in emergency as distinguished from the construction ordinarily used for permanent or fortification work to which the army was accustomed, and developed it into an organization functioning along commercial lines, coupling it with the military only to such an extent as was necessary to comply with law and to develop requirements. Confronted with a construction program involving work of a volume and at a rate of speed never before attempted, the Secretary of War saw the necessity of affording this organization direct access to the source of ultimate authority; free, but with resultant responsibilities to perform without the delays of military channels the gigantic task of housing the new army. The Secretary of War established the Cantonment Division, vesting it with the right to report direct to him and to communicate by order of the Secretary of War with department and other commanders.

In advance of construction the material market had been surveyed, and for each cantonment great quantities of materials had to be secured for the houses, streets, drainage and water systems required.

HOG ISLAND'S GREAT SHIPBUILDING PLANT

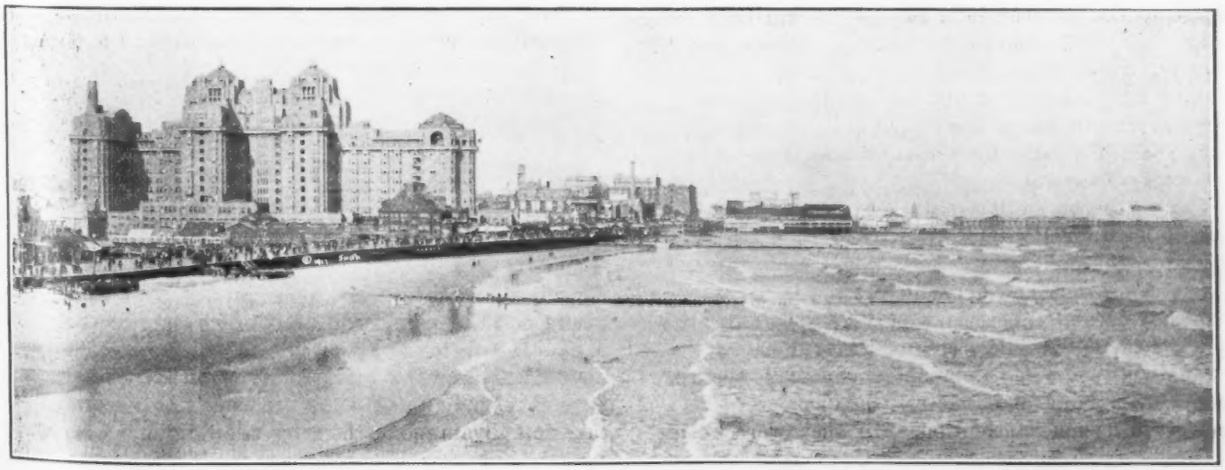
Fifty Shipways and Seven Outfitting Piers in This Tremendous Yard—The Part Played by Electricity

An important and highly interesting address was delivered by W. H. Blood, Jr., assistant to the president of the American International Shipbuilding Corporation at Hog Island, Philadelphia, before the N. E. L. A., covering the work done at Hog Island and giving figures on construction and making other important public announcements.

The shipyard itself will contain fifty shipways and seven outfitting piers capable of handling twenty-eight ships at one time. It is as large as six of the largest shipyards in the country at the outbreak of the war, and has a capacity equal to one-quarter of the present total capacity of all the shipyards in Great Britain.

The wires supplying electric service for motors and lights throughout the yard total 3,000,000 ft., or long enough if stretched in a straight line to run from Portland, Me., to Richmond, Va. Forty thousand electric lamps will be used to illuminate the yard and the ships and 650 electric motors will provide power.

To-day a number of delegates to the convention are to be conducted to the Hog Island yard of the American International Shipbuilding Corporation by W. H. Blood, Jr., where they will be shown some of the work.



The Effective Application of Protective Lighting

Improper Distribution of Light a Common Fault—Searchlight and Floodlamp Requirements—Floodlighting Versus Distributed Lighting—Examples of Protective Lighting

BY H. H. MAGDSICK*

EDMUND LEIGH, chief of plant protection, Military Intelligence Bureau, has stated that of the important means of protection against fires, explosions and sabotage in our industrial establishments, utilities, storage and forwarding systems, the value of lighting and its effective application are least appreciated and understood. An inspection of numerous plants and a consideration of current recommendations

FIG. 1—SILHOUETTED FORM AGAINST AN ILLUMINATED BACKGROUND

in this field of illumination confirm Mr. Leigh's statement and suggest the desirability of emphasizing the points covered in the following notes.

A protective lighting system to be effective must be comprehensive. The danger of attack from within a plant is no less than that from without. Therefore, in the majority of installations provision should be made to light not only the boundaries and approaches, but every part of the yards and all interior spaces, so that no one can approach the plant from the outside or attempt to work destruction anywhere within its limits without being easily observed by armed guards or loyal employees. Occasionally the guards may be so stationed that, while themselves concealed in a shadow or dark area, sufficient surfaces about them will be lighted so that any one passing where no light falls directly upon him will nevertheless always be between a guard and a well-lighted surface and will therefore be distinctly outlined in shadow, as is the man in Fig. 1. More often the safe and practical way is to light every part of the plant.

The intensity of illumination which is provided must be adequate to meet conditions of visibility which are short of the ideal. The amount of light required in a clear atmosphere must be considerably increased to be effective when haze or smoke is present. A higher intensity is necessary when street lamps, brightly lighted windows or other sources are in the field of vision than when the background is always black. If the buildings are dark, more light is required than when their surfaces have a high reflection factor. An intensity entirely too low to reveal a menace quickly is one of the most common deficiencies in yard and boundary lighting. By providing illumination generously the drain on man power for guarding purposes is greatly reduced.

Ineffective Distribution of Light a Fault of Many Installations

Much of the expenditure for protective lighting is wasted because the light is ineffectively distributed and directed. In general, illumination should be obtained at every point from more than one unit and from more than one direction. Bad shadows will thus be obviated and the failure of individual lamps will not leave large areas unprotected. Glare often nullifies the value of lighting. Particularly is this true where one encounters exposed sources or the direct beams from projectors at a low mounting height. To facilitate vision, glare should be minimized so far as possible by using accessories which shield the eye from the light source or by mounting units high above the usual line of vision. Diffusing globes reduce the contrast in brightness between the source and its background and thereby lessen the glare somewhat in interiors or when placed near light walls of buildings. Their glare-reducing value is slight, however, when they are viewed against a black background such as usually obtains out of doors, for the ratio of brightness is not greatly reduced.

Several types of equipment employed extensively for

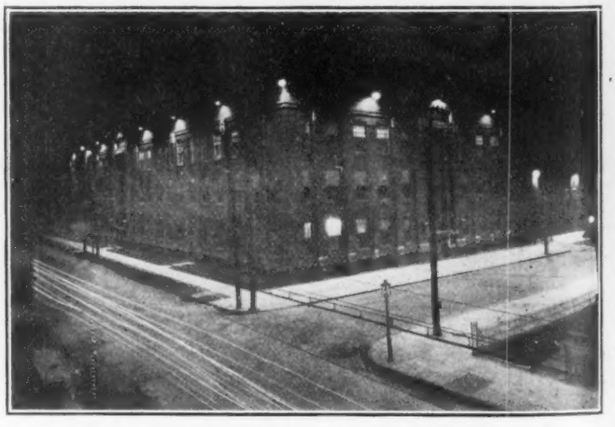
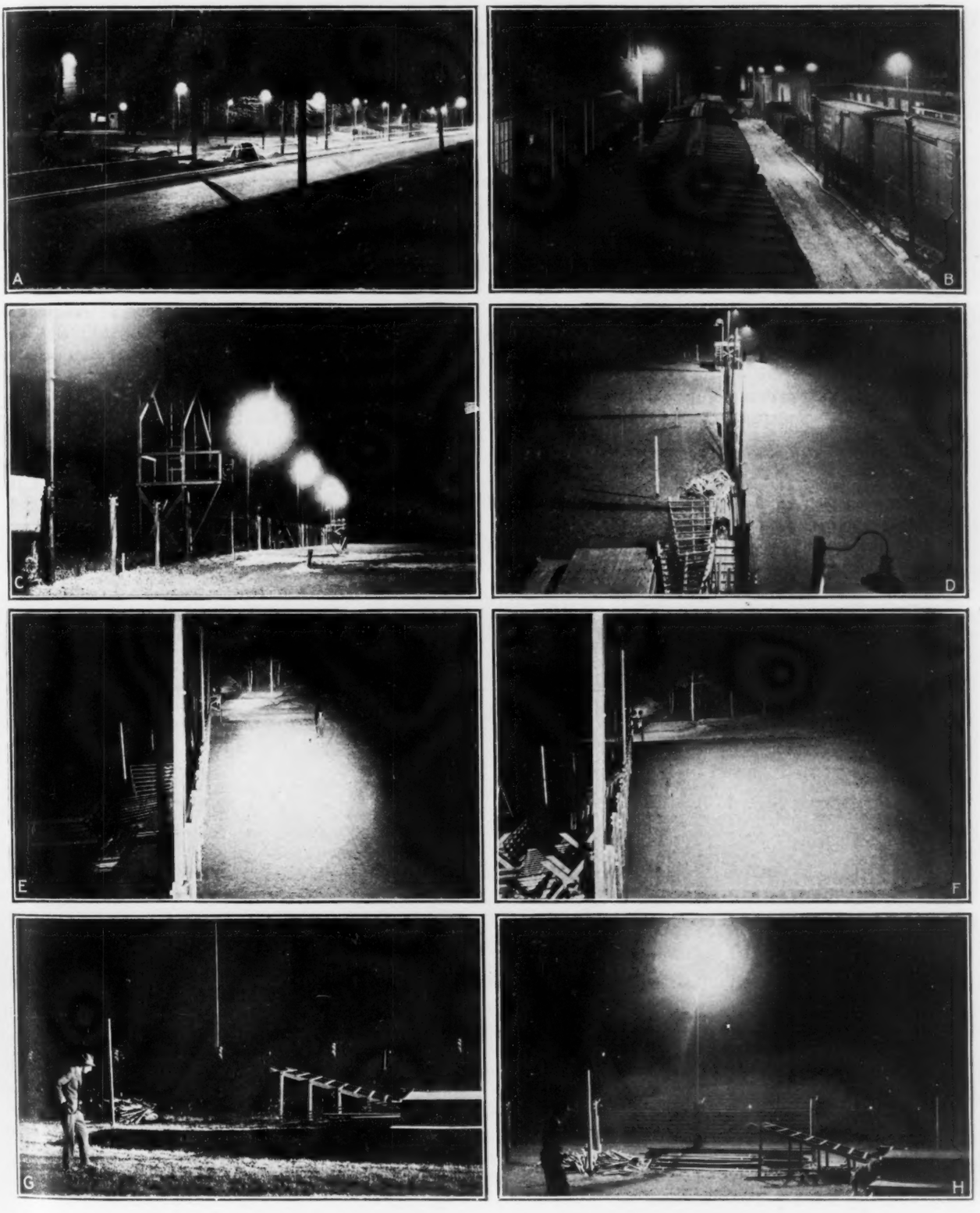


FIG. 2—ANGLE-TYPE ENAMELED-STEEL REFLECTORS WITH 300-WATT LAMPS

protective lighting are listed in Fig. 13. In selecting any of the equipments for out-door service one should be careful to secure well constructed, weatherproof fixtures. In a few cases the deep-bowl type of enameled steel reflector is of value in giving the maximum protection against interference with vision. Usually the

*Engineering Department National Lamp Works of General Electric Company.



FIGS. 3 TO 10 INCLUSIVE—COMPARISONS OF PROTECTIVE LIGHTING

A—Dome-reflector fixtures with 200-watt units reinforce street lighting. B—Dome reflectors around fence line. Units should be added along building face to avoid darkness cast by cars. C and D—Dome reflectors around boundary of large plot. E and F—Same inclosure shown in C and D, but boundary is illuminated with floodlamps having spreads of 15 deg. and 25 deg. respectively. G and H—Man hiding at end of lumber pile is concealed by shadow when floodlighting is used but visible with local lighting.

dome type gives ample protection and is to be preferred because of the wider spread of light and greater output. In order that glare may be reduced with prismatic refractor fixtures, they should be ordered with the socket so placed that the maximum candlepower is delivered at angles from 15 deg. to 20 deg. below the horizontal. The intensity at angles near the horizontal will then be greatly reduced.

It may be noted that floodlighting units are available for a wide range of beam spread, permitting a selection

to meet varied requirements. With the specially concentrated filaments of the floodlighting lamps, accurate control of the light is possible, so that beams of small as well as large angular divergence can be obtained. The projectors shown at *c* and *d* in Fig. 13 are designed for use with such lamps. Equipments illustrated in *a* and *b*, which employ the regular multiple lamps pendent in the reflector, do not permit confining the beam to so narrow an angle because of the greater area of the light source.

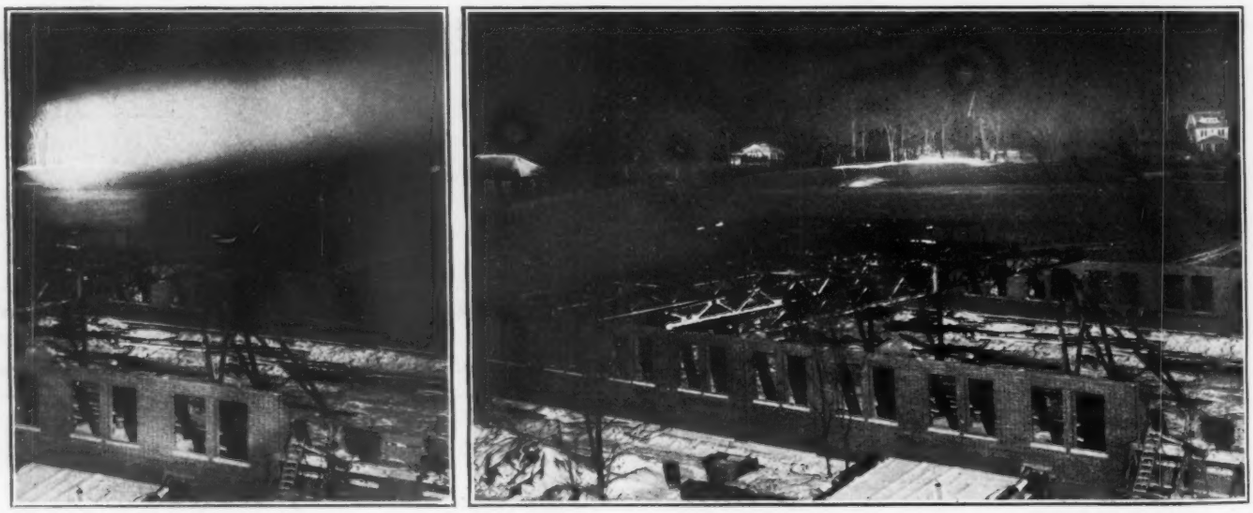
The percentage of light directed into the beam varies greatly. Two characteristics determine the efficiency of projectors—the reflection factor of the surface and the depth of the reflector, *i.e.*, the percentage of the light from the lamp intercepted. Mirrored glass is becoming the standard reflecting surface, for it has a high efficiency which can be permanently maintained. The reflection factor is from one-fourth to one-third greater than that of the polished aluminum and nickel surfaces commonly employed in metal-reflector units.

SEARCHLAMP AND FLOODLAMP REQUIREMENTS ARE DIFFERENT

A large number of floodlighting projectors are still sold with shallow parabolic reflectors, directing only 18 to 25 per cent of the light into the beam. This condition exists because many designers have followed searchlighting practice without differentiating between floodlight and searchlight requirements. In designing or using searchlamps one is concerned only with securing the highest possible intensity at the center of the beam. It is desirable to suppress the light radiating at wide angles from the center of the beam so that the observer watching the distant illuminated area from his station near the searchlight may suffer the least interference with vision. The spread of the beam is determined by the angle which the light source subtends at the reflector; hence best results are obtained by using a paraboloid of relatively long focus, and therefore shallow, for a given diameter. In floodlighting one is concerned with delivering as large a percentage of the light from a lamp as possible to an area at a relatively shorter distance and viewing this area at closer range. Therefore a greater divergence of beam is usually required and the scattered light does not become detrimental, but on the contrary is frequently useful.

For most floodlighting it is possible to employ the deeper reflectors with contours formed and combined in such a manner as to redirect a large proportion of the light from the lamp. Such deeper projectors are illustrated, for the ordinary multiple and floodlighting lamps respectively, in *b* and *d* of Fig. 13. The common practice of employing the shallow paraboloid with the ordinary multiple lamps of large light source, as in *a*, is obviously very wasteful, when with an intelligent design it is possible to increase the output in the beam by from 50 to 100 per cent.

With the possible exception of the opal-globe equipments, all types of units listed in Fig. 13 can be used advantageously under many conditions, although each is better adapted than the others for certain applications. Many people have come to regard floodlighting units as the one type of equipment suited to protective service. The fact that they are relatively new and that they opened up new possibilities in lighting seems to have led to an exaggerated estimate of their performance and value. From Fig. 13 it is apparent that a projector mounted at a remote point actually delivers less light to a given area than would be secured from ordinary types of equipment in this area. However, it does not follow that the latter are always to be preferred; due weight must be given to other factors as well. The relative advantages of lighting with floodlamps and with distributed systems of the other types of lighting units may, in a general way, be summarized as follows:



FIGS. 11 AND 12—BEAM FROM SEARCHLAMP FOCUSED ON ONE SPOT; BROADER BAND OF LIGHT PRODUCED WITH SAME SEARCHLAMP FITTED WITH FACTORY-RIBBED GLASS COVER

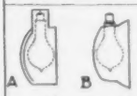
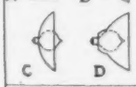
FLOODLIGHTING VERSUS DISTRIBUTED SYSTEMS

Dome and angle enameled-steel reflectors and prismatic refractor fixtures must be distributed at moderate spacings on supports relatively near the area to be illuminated. This distribution of units results in the marked advantage that at a given point light is usually received from several lamps and from different angles, thus obviating dangerous shadows and minimizing the effect of the outage of an individual lamp. Such equipments are efficient and their cost is relatively low. To mount the fixtures, however, it is sometimes necessary

to erect additional poles or other supports and extend the lighting circuits.

With projectors a different practice may be adopted, for the control of light in narrow beams gives the advantage of mounting equipment at a few favorable points, often on existing circuits, and delivering the light to areas at a distance. Thus the cost of additional poles and wiring is frequently saved, but this advantage is usually more than offset by the relatively high cost of the projectors themselves and the somewhat lower utilization of light flux. This is particularly likely to be the case if a sufficient number of lamps are installed at different points to eliminate long, sharp shadows. Furthermore, it is difficult to arrange floodlamps so that objectionable glare will not at times be experienced, nullifying much of the value of the light.

EQUIPMENT FOR PROTECTIVE LIGHTING

ACCESSORY	LAMP	PER CENT OF LIGHT FROM LAMP DELIVERED BELOW HORIZONTAL
DOME TYPE ENAMELED STEEL REFLECTOR	Mazda B and Mazda C; Multiple of all sizes to 1000 watts	75 – 80
ANGLE TYPE ENAMELED STEEL REFLECTOR	Mazda B and Mazda C; Multiple of all sizes to 1000 watts	60 – 65
PRISMATIC REFRACTOR FIXTURE	Mazda C; Multiple of 75 to 1000 watts Mazda C series of 60 to 1000 candlepower	60 – 70
OPAL GLOBE UNIT	Mazda B and Mazda C; Multiple of all sizes to 1000 watts Mazda C series of 60 to 1000 candlepower	35 – 50
FLOOD-LIGHTING PROJECTOR		PER CENT OF LIGHT FROM LAMP DELIVERED IN BEAM *
 A B BEAM-SPREAD 8°–15°	Mazda C flood-lighting 200 and 400 watts	20 – 40
BEAM-SPREAD 12°–84°	Mazda C flood-lighting 200 and 400 watts	30 – 50
 C D BEAM-SPREAD 40°–60°	Mazda C flood-lighting 400 watts	40 – 45
BEAM SPREAD 15°–50°	Mazda C; Multiple 300 to 1000 watts	20 – 40
Incandescent Searchlight	Highly concentrated filament Mazda C	1,000,000 to 5,000,000 Beam candlepower

* In addition, some light is emitted at wider angles directly from the lamp itself or scattered from the reflector. This may sometimes also be useful.

FIG. 13—TYPES OF EQUIPMENT EXTENSIVELY USED FOR PROTECTIVE LIGHTING

Nevertheless, when they can be carefully located and mounted high on pole brackets, platforms or roofs of buildings excellent lighting may be secured. The outage of individual projectors is likely to be far more serious than that of a unit of the other types in a more distributed system; also, where a number of projectors are mounted on a platform there is danger that all of the lighting for a large area may be put out by one quick attack. Floodlamps are particularly valuable for providing light quickly in an emergency, for supplementing the ordinary systems and temporarily reinforcing the intensity at certain points. They fill a great need in illuminating locations in or near which no wiring can be carried or no supports placed for the older types of lighting fixtures.

A number of applications of the lighting equipment listed in Fig. 13 are illustrated in Figs. 2 to 12. The plant shown in Fig. 2 is located directly on a city street and the units employed are angle enameled-steel reflectors with 300-watt lamps attached to the building. For mounting heights of 25 ft. (7.6 m.) or more, and spacings not more than twice the height, this system is a desirable one, although sometimes it may be improved by tilting the units in slightly to minimize the glare. Where the building surface is light and for lower mounting heights, dome reflectors are preferable, spaced not more than three times their height.

Dome reflector fixtures with 200-watt units mounted 20 ft. (6 m.) above the pavement reinforce the street lighting in Fig. 3. On the building face are two angle units which help to illuminate the space in front of the building and assist the watchman in identifying persons approaching the plant. A similar installation of dome reflectors is carried on the pole line along the fence bounding another side of this property (Fig. 4). In either case the spacing should not be more than four times the height of the units. Higher mounting is advantageous; a height lower than 20 ft. (6 m.) is likely to be objectionable except for lamps as small as 100 watts. It may be noted that the cars which have been left standing in the yard throw the strip adjacent to the building in darkness. Units should have been added along the face of the building to prevent this condition.

Dome reflectors like those just referred to but equipped with 100-watt to 500-watt-lamps are also particularly suitable for protecting the boundaries of large inclosures, as shown in Figs. 5 and 6. The views are respectively those of a patrolman on the ground and a watchman at an elevated post. Prismatic refractor fixtures are also desirable for this service. They illuminate a wider zone, and the spacing may be increased to eight times the mounting height. The largest sizes of lamps are therefore often employed with such equipment.

The same inclosure protected by a zone of light from projectors with a beam spread of 15 deg. and 25 deg. respectively is shown in Figs. 7 and 8. One edge of the beam is directed along the fence, allowing the patrolman to walk inside in comparative darkness. The projectors are placed 12 ft. (3.6 m.) above the ground, one every 200 ft. (60.9 m.), and the beams pointed in one direction around the inclosure. So long as the patrolman is able to walk in the direction in which the projectors are pointing, conditions for vision are excellent. If, however, it becomes necessary for him to turn around and face the units, the glare he experiences will make the lighting ineffective. Therefore it is better to mount the projectors high on pole brackets or elevated platforms. When they can be placed 30 ft. to 60 ft. (9.1 m. to 18.2 m.) above the ground the interference from glare is very greatly minimized.

An error which is commonly made is to space projectors at too great a distance. The range is rapidly reduced as the atmosphere becomes hazy; also the outage of a unit becomes more serious as the spacing is increased. Where mounted low, as in the illustrations, the maximum spacing recommended is about 250 ft. (76.2 m.), and this value should be reduced for the widest-angle units. Under favorable conditions, where the projectors are mounted high and the largest lamps are employed, the spacing may be increased.

For lighting the yard proper, various types of accessories may be utilized. Angle reflectors attached to the buildings may be employed to light adjacent spaces, if mounted 25 ft. (7.6 m.) or more above the ground.

Dome reflectors and prismatic refractors on brackets attached to buildings, poles distributed throughout the yard, etc., meet the requirements best in the majority of properties. When floodlighting projectors can be placed sufficiently high and at various points so as to deliver light from several angles, good results may be obtained by their use. However, there is always danger that glare will not be sufficiently minimized and that piles of material or other obstructions in the yard will cast long, dark shadows, creating an accident hazard and affording a place of concealment. Such a condition is illustrated in Fig. 9, where the light is coming from one projector. With a greater number of smaller wattage lamps in dome reflectors distributed about the yard, these dark shadows are eliminated and the guard is able to detect the intruder (Fig. 10). The conditions could also have been improved if projectors had been directed at this point from both sides.

Narrow-angle floodlamps on building roofs or elevated platforms are valuable in lighting long approaches to a plant or sweeping open fields or waterfronts about a property. Incandescent-lamp searchlights greatly increase the range. With one of these the attendant will be able to "pick up" a man at distances as great as one-half mile (8 km.). In Fig. 11 the beam from a searchlamp of this type is directed at a point about 1000 ft. (304 m.) from the building on which it is mounted. Occasionally it is of value to have a beam which is wider horizontally, while any greater spread vertically would be wasted. Under these conditions a piece of factory-ribbed glass may be substituted for the clear-glass cover, resulting in a band of light of wide horizontal divergence but little vertical scattering, as shown in Fig. 12. The intensity at the middle of the beam and the range of the unit are of course considerably reduced.

Readjustment and Reconstruction Commission—II

The President's Commission, Composed of Experienced Men in the Industrial, Commercial, Financial, Transportation, Labor and Educational Worlds, Would Help Make Us Ready

BY WINGROVE BATHON

Washington Representative ELECTRICAL WORLD

AN OUTLINE of a proposed Presidential readjustment and reconstruction commission, to deal in this country, now, with problems that will present themselves after the war, was suggested in these columns on June 1. It was suggested that such a commission, appointed by executive order of the President of the United States, with personnel selected from leaders in private industrial effort in the United States, should have the assistance of an advisory council, also appointed by executive order, whose personnel should be selected from executive officials and legislators of the government.

SUGGESTED PERSONNEL OF COUNCIL

Such an advisory council should be selected from those who are especially charged with the conduct of affairs vital to the industrial, commercial, financial, transportation, labor and educational worlds. Realizing the demands made by the war on the chief Cabinet officers, it should not be expected that they should serve actively on such a council, although in one or two cases, such as that of William P. G. Harding, the governor of the Federal Reserve Board, principal officials, rather than those second in command, ought to be selected. In the case of legislators, many chairmen of Senate and House committees are also too much occupied with war legislation to deal now with after-the-war problems. Officials of executive departments on such an advisory council should be charged not only with the duty of giving advice and outlining governmental policies of the present and possible policies of the future, but should detail to the service of the commission experts in their own departments. In the following list strict order of precedence and rank in the government is not followed, but such an advisory commission or council should include:

Frank Lyon Polk, counselor for the Department of State, for all international contact.

F. M. Simmons, chairman of the Senate committee on finance, for contact on future government revenues and taxes.

Claude M. Kitchen, chairman of the House ways and means committee, for contact on future government revenues and taxes.

Duncan U. Fletcher, chairman of the Senate committee on commerce, for contact on legislation affecting commerce.

Thetus W. Sims, chairman of the House committee on interstate and foreign commerce, for contact on legislation affecting commerce.

Gilbert M. Hitchcock, chairman of the Senate committee on foreign relations, for contact on future international legislation.

Henry D. Flood, chairman of the House committee on foreign affairs, for contact on future international legislation.

John Bassett Moore, vice-chairman United States Section, International High Commission, for contact with international law, patents, trademarks, etc., in Latin America.

John Barrett, director general Pan-American Union, for Latin-American contact in detail.

William P. G. Harding, governor Federal Reserve Board; Charles S. Hamlin, president Capital Issues Committee, and Sherman Allen, treasurer War Finance Corporation, for contact on finance.

E. R. Stettinius, Assistant Secretary of War, for contact in industrial war production, and Rear Admiral Samuel McGowan, paymaster general of the navy, for contact on industrial naval production.

Maj.-Gen. E. H. Crowder, provost marshal general, for contact on reintroducing returned soldiers to industry.

William H. Taft and Frank Walsh, chairmen War Labor Board, for contact with war labor problems and activities.

John A. McIlhenny, president Civil Service Commission, for contact on government employment.

Carl Vrooman, Assistant Secretary of Agriculture, for contact with the soil and its agricultural products.

Edwin F. Sweet, Assistant Secretary of Commerce, for contact with the census and other bureaus dealing with commerce.

William B. Colver, chairman Federal Trade Commission,

for contact with the coming administration of the Webb act, which permits combinations for foreign trade, and for contact on unfair practices under the Newlands act.

F. W. Taussig, chairman United States Tariff Commission, for contact on material now being gathered by commission on after-the-war problems.

Raymond B. Stevens, vice-chairman United States Shipping Board, for contact on tonnage available after the war.

Herbert Hoover, United States Food Administrator, for contact on food licenses during reconstruction period and possible repeal of laws.

H. A. Garfield, United States Fuel Administrator, for distribution of coal and oil and possible repeal of laws during and after reconstruction period.

Walker D. Hines, assistant to the Director General of Railroads, for contact with transportation and terminals after the war.

A. Mitchell Palmer, alien property custodian of the United States, for final disposition of enemy-owned plants and other property.

Bernard M. Baruch, chairman of the War Industries Board, for contact on sources of supply of raw materials and finished products.

Walter S. Gifford, director of the Council of National Defense, for contact on reviving less essential industries.

Vance C. McCormick, chairman War Trade Board, for contact on licenses for imports and exports after the war.

Executive secretary (when named) of the water-power commission of Cabinet officers which is about to be created.

Daniel C. Roper, Commissioner of Internal Revnue, for contact on collection of excess profits taxes, etc.

Charles D. Walcott, president National Academy of Sciences, for government contact with the sciences.

Charles F. Nesbit, Division of Military and Naval Insurance, for contact on personal insurance problems and defectives on his rolls who are returned soldiers.

Philander P. Claxton, Commissioner of Education and secretary of the Federal Board for Vocational Education, for contact on educational statistics and statistics on defectives.

George Creel, chairman committee on public information, for assistance and contact in educational work.

It is respectfully submitted that this is no mere list of names. Broadly speaking, it is an analysis of the industrial war organization of the United States, and a reading of the suggested contacts will show that the work of these officials and that of their departments, bureaus and associates will be just as vital to the solving of after-the-war problems as it is vital to winning the war now. The two problems cannot be separated. All national contacts to-day are international. We think and move in terms of world-wide importance.

TASKS THAT WOULD CONFRONT COUNCIL

After four years of war England has found it necessary to tear up and move to France between 15 and 20 per cent of her main-line tracks. If the war goes on a long while, if there is not iron enough, if there is not steel enough, if there is not labor enough, if there is not constant maintenance, something like that might happen in this country. Then there will be need for actual physical reconstruction in this country, as there is abroad, instead of need merely for readjustment. Plans for such possibilities must be made now. Again, it is estimated that we shall have within a year from 45,000 tons to 50,000 tons of steel-ingot producing capacity and probably 100 per cent greater finishing-machine producing capacity than we had in 1913, in which year we were obliged in many lines to go abroad for a market for our surplus production. What plans are in the making for our surplus production after the war? Again, it is estimated that we shall have, with what we now have, 15,000,000 tons in merchant ships available after the war. What definite trade routes from American ports to the other ports of the world are being thought out?

The biggest American businesses which have been built up abroad have been in machine-finished steel products, such as talking machines and music machines, cash registers, agricultural machinery, adding machines, sewing machines, etc. Plans must be made to introduce these special products. One company now represented in Washington desires to open an office at Rio de Janeiro; another desires to send 600,000 tons of shipping to Australia next year. Is there any governmental agency or semi-governmental agency in Washington to offer encouragement or authoritative advice? No.

What is being done to divert to American ports the rehandling business previously done in Europe, such as the bringing of rice from India, to reclean it, regrade it and reship it? What is being done to hold for the United States the rubber which formerly went to England, now coming here to avoid two trips through the submarine zone? What is being done to hold for the United States the business in tin which formerly went to England and Holland from Bolivia? What is being done to hold for the United States the business in coffee which originally went almost entirely to Europe, at which time we paid for the longer freight haul and commissions in London, Hamburg and Bremen, and much of which now comes to this country?

An advisory council such as has been outlined in this article, working with the proposed Presidential readjustment and reconstruction committee or commission, could answer these questions, if answers are in existence; and if not could place industry through the commission in a position to meet such problems as have been suggested and a thousand more. The United States Tariff Commission is one of the few governmental agencies which are avowedly gathering data for after-the-war problems. The Federal Trade Commission, the Department of Commerce and the War Trade Board are also collating information. But there is no apparent co-ordination of these efforts, such as there is in England and other countries. The next article in this series will deal with what is being done in that respect in England.

Book Review

THE EMPLOYMENT DEPARTMENT AND EMPLOYEE RELATIONS. By F. C. Henderschott, New York Edison Company, and F. E. Weakly, employment manager Montgomery, Ward & Company. 60 pages, illustrated. Chicago: LaSalle Extension University.

With the present high rate of turnover this volume, published as part of the material for the course in business administration at LaSalle Extension University, becomes of unusual interest. It describes the organization and duties of an employment department, the function of its manager, relations to other departments, sources of labor supply and the scientific method of selecting those to fill situations. Practical questions of transfers, promotions and general welfare work are discussed. The analysis sheets of physical examinations of "turnovers" ought to prove particularly suggestive.

STATION & OPERATING PRACTICE

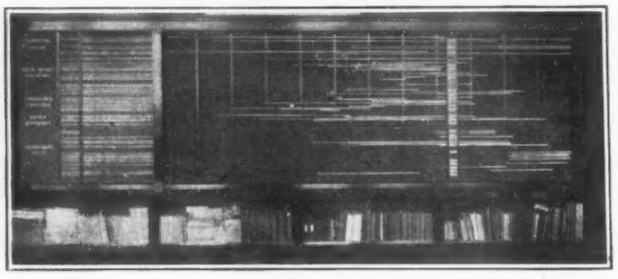
A Department Devoted to Problems of Installation, Operation and Maintenance of Equipment for Economical Generation and Distribution of Electrical Energy

A SCHEDULE BOARD FOR ENGINEERING DEPARTMENT

Plan Which Allows the Schedule of Any Job to Be Changed Without Disturbing the Remainder of the Board

BY H. E. WULFING

For the purpose of keeping the members of the engineering department and others interested informed as to the work on hand—its progress and the scheduled date for completion—the Commonwealth Edison Company of Chicago has installed in the engineering department the novel schedule board shown in the illustration. The board proper is about 5 ft. (1.5 m.) high by 16 ft. (4.9 m.) long and is divided into two sections, the first section showing the class of the station, the name of the substation and a description of the work to be done. The second section is the schedule proper.



BOARD INDICATES PROGRESS OF JOB AND ESTIMATED DATE OF COMPLETION

The first section is backed by cork linoleum, on which are pinned strips of paper showing the name of the substation and a brief description of work to be done. The second section is divided vertically into twelve parts headed by the months of the year, and at intervals of about 1 in. (2.54 cm.) steel wires are strung horizontally across the board. Strips of colored bristol board are attached to these wires by means of a paper clip. The color of the bristol board represents the kind of work being done—that is, whether building work or electrical construction—and the length of the strip indicates the estimated time to complete it. The location of the strip of paper on the wire indicates the time at which it is proposed to do the work. In order to facilitate reference the work involved is printed on the strip.

By means of colored stars pasted on each strip the date at which apparatus is to go into service is indicated. Other colored tags indicate apparatus to be moved or removed. A movable index is hung on a rod from the top of the board, indicating the current date.

The board is maintained as follows: As soon as the installation of apparatus is authorized the head of the department issues a preliminary order covering the engineering work and giving the scheduled date of completion. This order is issued in multiple and copies are sent to the engineer of design, the engineer in charge and the clerical division. The engineer of design makes an estimate as to the probable time it will take to complete the work. This information is given to the clerical division, which incorporates it on the schedule board. Any changes in the scheduled date or the probable duration of the job are made by supplementary orders to the original order by the head of the department, so that any additions or changes in this schedule board are made by his authority only.

This board has the advantage over a printed schedule in that it is possible to easily change the schedule for any one job without disturbing the rest of the board. As a result of this the schedule leads the work instead of lagging, as is the usual case.

LIGHT STRUCTURAL CARRIER SAVES TIME IN MACHINE TESTS

Meter Placed in Upright Position Near Apparatus Eliminates Temporary Construction and Obviates Use of Nails

To facilitate the use of a heavy curve-drawing ammeter in substation tests, H. J. Howarth, superintendent of the meter department of the Cumberland County Power & Light Company, Portland, Me., has designed the structural steel carrier illustrated herewith. The 2000-amp. meter is provided with four bolts so that it can be hung in four slots in the carrier. The frame is 30 in. (76 cm.) long, 23 in. (58.3 cm.) wide and 4 ft. (1.2 m.) high. The meter can be securely installed on the carrier by one man.

STRUCTURAL STEEL FRAME FOR TEST METER

ASBESTOS INSULATION REDUCES LEAKAGE AND CONSERVES HEAT

Investigations of United States Bureau of Mines Show that Brick Conducts Heat Faster than Asbestos and Increases Loss in Boiler Settings

The use of asbestos insulation between the courses of the brick settings of boilers reduces air leakage and conserves heat that is usually wasted with the ordinary air space, according to recent investigations of the United States Bureau of Mines. Firebrick should withstand temperatures up to 3000 deg. Fahr., but it is a good conductor of heat and conducts it six to ten times as fast as the asbestos felt. Red brick conducts heat about five times as fast as the felt. Insulating material with smaller air spaces reduces convection losses far better than material with the larger air spaces. This practice is especially timely with the present fuel prices, and the result shows that it is not economical to use cheaper insulations for high steam pressures. When subjected to temperatures of 1200 deg. to 1500 deg. Fahr., the disintegration of the better grade of asbestos fibers starts and the material gradually becomes more brittle, not going to pieces, however, much below 1800 deg. Fahr.

SUBMARINE CABLE LAID UNDER MISSISSIPPI RIVER

Eliminates Necessity of New Machinery and Provides Permanent Connecting Link Between St. Louis and East St. Louis Companies

Two 5000-kw., 13,200-volt, three-conductor submarine cables about 2500 ft. (762 m.) long have recently been laid across the Mississippi River, connecting the systems of the East St. Louis (Ill.) Light & Power Company and the Union Electric Light & Power Company of St. Louis, Mo. These cables form a connecting link between the two systems and eliminate the necessity of the immediate installation of new machinery on the Illinois side of the river.

The cables consist of three No. 4/0 B. & S. gage conductors insulated with 7/32-in. (0.551-cm.) 30 per cent rubber compound and 1/16 in. (0.16 cm.) varnished cambric. The conductors are held together with a band of 1/8-in. (0.3-cm.) varnished cambric and a 9/64-in. (0.36-cm.) lead sheath. This sheath is covered successively with two layers of tar jute braid, an armor of No. 4 B.W.G. steel wire and two layers of aspshalted jute braid.

The cables were laid simultaneously from a barge towed by tugs. The actual work of laying the cables required only about one and a quarter hours, and the entire job was completed by working continuously for sixteen hours. Four reels of cable in 1250-ft. (381-m.) lengths were placed upon the barge and two reels were paid out at the same time. The cables were then spliced to the remaining two reels by means of standard splice boxes and the remainder of the cable was laid. Considerable difficulty was encountered during the splicing owing to the tendency of the cables to go downstream. This was prevented by heading the tugs upstream and running the propellers while the splicing was in progress.

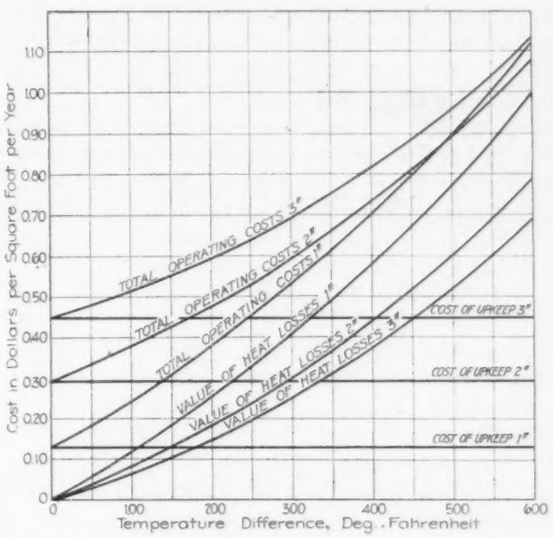
The cables are connected to the Ashley Street power house on the Missouri side by two 1500-ft. (457-m.) standard underground cables. The Illinois end of the cables terminate in a switch house on the river levee. This cable is laid at a depth of about 3 ft. (0.9 m.) underneath the levee and is protected at its terminals by aluminum-cell lightning arresters. The two cables can be paralleled in the switch house by disconnecting switches. The remainder of the connecting link between the two systems consists of an overhead transmission line running from this switch house to the Lake Street substation of the East St. Louis company.

CHART FOR DETERMINING ECONOMY OF INSULATION

Permits Comparison of Expense Chargeable to Pipes Insulated with 85 per Cent Magnesia with That of Uninsulated Pipes

BY AUSTEN BOLAM

By calculating the volume of heat loss from insulated pipes and adding the fixed expense and cost of maintaining the insulating material a decision can be reached as to the expenditure which can be economically made to insulate pipes. Curves which take these considerations into account are given in the accompanying illustraction, the actual cost per year per square foot of surface covered being shown direct.



TOTAL EXPENSES CHARGEABLE TO PIPE INSULATED WITH 85 PER CENT MAGNESIA

The horizontal lines represent the cost of upkeep, and the curves radiating from zero give the value of the heat losses at various temperature differences. The temperature difference to be used is found by subtracting the temperature of the surrounding air from the temperature of the steam in the pipes. By adding the constant and variable costs the total expense chargeable to insulated pipes is obtained. This is shown by the remaining curves.

Referring to a handbook or similar source of information, the loss from bare pipes can be obtained and a comparison made. The experiments on which this chart was based were made at the Mellon Institute of Industrial Research at Pittsburgh, Pa. Insulating material known as 85 per cent magnesia was used in the tests, which covered a year's time.

CENTRAL STATION SERVICE

A Department Devoted to Commercial Policy and Management Topics, Including Applications of Electric Light, Power and Heat

SALESMAN'S ASSISTANCE IN SELECTING TRANSFORMER SIZES

From a Careful Study of Load to Be Connected a Considerable Saving in Transformer Capacity May Result

BY A. G. DRURY

The salesman for the central station is finding the rising cost of construction quite a formidable consideration. The central stations are more conservative than formerly in making extensions, owing to their exorbitant cost, and many are asking the prospective consumer to pay a part of the expense. It is well known that the more money a "prospect" is asked to advance the harder it is to close the contract. It follows therefore that any information which the salesman can gather that will tend to decrease the expenditures will make it easier to do business.

The primary function of the construction department is to build and maintain the lines as economically as possible, and any assistance which the commercial man can lend in this work by his knowledge of the character of the power load to be added is likely to be appreciated by the superintendent.

One way in which to assist is in the selection of the size of transformers. It is evident that if at the end of the year the reports show that 2000 kw. connected load has been added to the system with 1000-kw. transformer capacity, it is better than adding 2000 kw. and 1500 kw. in transformers most of which are underloaded. The advantage exists not only in the amount of capital saved, but also in the amount of energizing current required by the smaller transformers as compared to the larger one.

As a concrete example there is related an incident which came up in connection with a contract for supplying electric energy to a company which made small brass and bronze casting cages such as are used in receivers' booths in banks, etc. The equipment which was to be driven by motors consisted of an elevator, a blower for gas furnaces, emery grinders, polishing machines, lathes, a milling machine, drill presses, etc., in all twenty-four such pieces of apparatus. The total number of motors to be installed amounted to 42 hp. The salesman had become familiar with the character of the work and reported that he had secured a 15-kw. maximum-demand contract. The manager accordingly ordered three 4-kw. transformers. One of the men in the office, knowing the motor equipment to total 42 hp., out of friendliness to the salesman told him that three 4-kw. transformers had been ordered, when there should have been three 10-kw. machines. Upon inquiry it developed that the rule was for the salesman to report 40 hp. or 30 kw., upon which three 10 kw. transformers would be purchased, whereas with co-operation established between the two departments considerable saving in equipment would be accomplished.

The difference in first cost is as follows:

Cost to purchase and erect three 10-kw. transformers	$271.50
Cost to purchase and erect three 4-kw. transformers	144.00
Saving in first cost	$127.50

A test made on the installation mentioned after completion showed the maximum demand to be 12 kw.

The salesman by studying the characteristics of any new business can save as well as make money for his company. From considerable experience similar to the above the writer has found that the capacity of the transformers serving an installation can often be limited to less than a third of the connected load; but the salesman must make each individual investigation himself and not rely on the published tables of average load or maximum demands for different manufacturing businesses. The time and energy invested will be justified by the returns.

ELECTRICAL ENERGY FOR HOUSING REQUIREMENTS

Considerations Which Will Govern the Supply as They Have Been Outlined by Government Committee in Charge of Work

It has been definitely decided by the Bureau of Industrial Housing and Transportation to light the industrial homes with electricity where this is available.

The considerations governing the installation of electricity and lighting are outlined by the bureau as follows:

1. It is to be expected that usually the housing development will only introduce electric light and energy when adjacent utilities are available and can extend their service into the district.

2. It is possible in exceptional cases that plants for this purpose may have to be created. If so, experienced electrical and mechanical engineers should be engaged to design and construct them.

3. When existing utilities are available, some form of contractual relation must be entered into by which rates and service standards will be defined.

4. Under ordinary conditions overhead distribution is contemplated, preferably by pole lines installed as far as possible in alleyways.

5. Under conditions where frequent street lighting is afforded by electric energy, modification of this method may be necessary and desirable in some cases.

6. Standards of materials and construction will, as a rule, be similar to those adopted and defined in the existing ordinances in the community where they are installed.

The bureau suggests that the investigation of local utility service should include a full description of the local electric light and gas plants, with a statement of capacity, connections, cost, street-lighting methods, rates and reliability of service.

DISTRICTING CITY AS AID IN SUMMONING PHYSICIANS

St. Louis Company Informs Employees Concerning Methods of Handling Emergency Medical Calls

When the services of physicians are required in emergencies by workers for electric light and power companies the saving of a few minutes sometimes means saving or failing to save the life of the victim. In order to reduce as much as possible the time required in calling the proper physician and getting him quickly to the injured person, the Union Electric Light & Power Company of St. Louis has divided the city into five districts and has published a map showing the divisions between these districts and giving the name and telephone number of the doctor who should be called in case of an emergency within any district. Employees of the company are urged to keep the chart where it will be instantly available.

THE KIND OF PUBLICITY FOR INCREASED RATES

Public Must Be Shown the Same Things That Are Put Before the Commission, but in a Simple and Direct Manner

To go about the matter of obtaining higher rates is a new idea. Formerly the utilities had to contend with the possibility of having their rates lowered. There was no thought of raising rates. Now that the necessity for higher rates has become evident new practices must be developed. It is pretty generally held that to be entirely successful in this connection the confidence of the public as well as that of the commission must be obtained.

This idea was developed to some extent by L. W. W. Morrow, director of the School of Electrical Engineering of the University of Oklahoma, at the recent annual convention of the Oklahoma Gas, Electric and Street Railway Association. He said:

Extension of service and more than necessary service are the watchwords of successful utility operation. The task of the utilities is to show the public that present conditions mean decreased service or advance in rates, and to get the public to accept voluntarily the increase in rates upon decision of its representatives, the corporation commission.

The gist of every publicity argument should be that unless rates are advanced service will be decreased. The latter condition will not be permitted by the public, whose demand is more and better service. The utilities must show:

1. That they are not getting a fair return on the actual capital invested.
2. That their financial condition is not a temporary condition with relief in sight, but is in fact increasing in seriousness with the lapse of time.
3. That the increase is necessary in order to furnish adequate service of the kind the public requires.
4. That the increase desired is only reasonable and just and that their motive in asking it is only the application of fair dealing to present conditions.

The public must be shown the same things a commission is shown, but it must be shown these things in a simple and direct manner. No lengthy treatise on "going concern," "depreciation," "reproduction," "new value," etc., appeals to the public. Simply show that operating expenses are so much, operating revenues another sum, and the difference inadequate to furnish the service desired by the public.

The utility publicity man must have several essential characteristics. He must be able to marshal his facts and present them in a telling and effective manner. He must believe in his own case enthusiastically and must be perfectly frank with his audience. He must be the personality of his company—no one cares about the hardships of the Blank Electric Company, but John Jones is a definite personality and his views and opinions are quoted and considered. The personality of the manager of a utility solves many vexatious problems in public relationship. The publicity man must establish the fact that a partnership exists between the utility and the public. Every one gets his share in the business either in wages, taxes, service or other returns. No one can take more than his share without affecting the others. The publicity man must reduce his statistics to the value of a dollar in order for the public to comprehend them. A balance sheet is a cipher to the average citizen he tries to reach. Publicity must be simple and concise—one fact at a time must be treated, and that fact must be handled in a manner to fix it in the mind of the citizen.

There are many methods for obtaining publicity—the newspapers, newspaper advertising, circulation, posters and street cars, addresses before civic bodies, personal relationship between the employees and the public are all legitimate means for obtaining publicity. The newspaper is the chief agent, as it reaches the maximum number of people. The publicity of the individual plant must be handled locally—no amount of generalization will be read by the local citizenship. The manager of the local utility is the one person to handle the public. A central bureau can compile his facts and arrange his material, but the manager's personal touch is essential in getting these facts across to his public. A lecture bureau is a great help in presenting matters to civic bodies of a general nature, but every question that is in dispute should be personally presented by the manager, even though in many cases he is far from being a fluent speaker or a logical floor talker.

The importation of a high-grade man by the utility to handle local disputes is poor policy, as it strikes the local people as a plan to talk them out of their side of the case by means of hiring an able lawyer. Instinctively the local people fall into an antagonistic mood. The manager, however, lives in the community and is one of the citizens and on a common basis with the local people from their point of view. Outside help can marshal the facts for the manager and obtain his material, but should not attempt to intervene directly in local disputes.

General publicity where there is no local dispute can be better handled by an able lecturer before civic bodies than in any other manner. A judicious use of newspaper advertising is also desirable.

NUMBER OF CUSTOMERS FOR REPORT PURPOSES

Pacific Power & Light Company Groups New and Lost Business Under Three Heads, According to Rate Schedule

Every installation that is billed under a separate rate schedule is counted by the Pacific Power & Light Company, Portland, Ore., as a customer in its monthly statistical report. Thus, a consumer having a lighting, power and range installation, although all on the same premises, is counted as three customers because each installation is billed under a separate rate schedule.

The company groups its new and lost business under the following heads: Class A business is secured when an additional load is added to an existing installation, and by installation is meant that load which is billed under any one rate schedule. Class B customers are secured when a load is connected where a similar service under the same rate schedule was rendered before. Class C customers are secured when a load is connected where similar service under the same rate schedule never was rendered before.

TECHNICAL THEORY & PRACTICE

Including a Digest of Important Articles Appearing in the Scientific and Engineering Press of the World

Generators, Motors and Transformers

The Commutator Machine as the Standard Single-Phase Type.—F. CREEDY.—The author cites advantages which could be realized through the universal employment of the commutator motor on single-phase circuits to the exclusion of the single-phase induction motor. He discusses the advantages of single-phase power over polyphase systems in certain districts and gives the relative costs, performance, weights and power factor of different machines. For variable speed it is desirable to vary both the auxiliary motor winding and the voltage from the transformer. In practice only three taps are provided on the motor winding and six on the transformer. By this means a sufficient number of combinations to give ten distinct speeds is provided, the field of the motor varying somewhat from the purely rotating character (which should theoretically be maintained) in the majority of these speeds.—London *Electrician*, April 19 and 26, 1918.

Elementary Principles of Continuous-Current Armature Winding.—F. M. DENTON.—The theory of equalizing connections is explained and rules are derived for the application of such connections. Chord winding is explained, and the use of interpolated commutator segments is discussed. Special consideration is given to the question of the number of slots that should be used for a given winding, taking into account the inductance of the parallel paths. The article concludes with a schedule of winding rules.—London *Electrician*, April 19 and 26, 1918.

Generation, Transmission and Distribution

National Electricity Supply in Great Britain.—The opinion is expressed that too great stress has been placed upon the saving of waste heat. Assuming that waste heat could be available generally as it exists around Tyneside, some 750,000 tons of coal per annum could be saved, which is only a small fraction of the 55,000,000 tons of saving promised. Furthermore, conceding that the £550,000 per annum might be saved by extensively utilizing waste heat, its importance is minimized when compared with the many millions to be expended. An important financial factor is the £210,000,000 initial cost to save 55,000,000 tons of coal per annum, and assessing the total capital charges at 8 per cent, there is an annual standing charge of £16,800,000 per annum, against a saving of £27,500,000 in coal.—London *Electrical Times*, April 25, 1918.

Utilizing the Escaping Steam at Coal Mines in Energy Production.—A. BARJOU.—First part of an article on this subject—an important one, the author holds, in view of the ever-growing use of electricity at coal mines. The problem consists of (1) the regulation of the steam escaping from the primary machines by its accumulation in a thermal or volumetric apparatus; (2) the utilization of this steam at low pressure by means of a turbine coupled to an electric generator; (3) the attainment of as high a vacuum as possible to insure the performance and improve the output of this turbine.—*L'Industrie Electrique*, May 10, 1918.

Feed Water for Steam Boilers.—J. A. MONTPELLIER.—The author estimates that when the incrustation caused to form on the sides of boilers by calcareous water reaches a thickness of 1 mm. (0.039 in.) it is necessary to increase combustion 10 per cent to get the same results as before any deposit was formed; if the thickness is 5 mm. or 6 mm., 40 or 50 per cent increase in combustion will be necessary. Eventually there is danger of an explosion. Cleaning the boilers is a long task which not only interrupts operations but also is likely to cause damage from the blows of the hammers. Feed water, the author says, ought not to contain too much of the salts of calcium and magnesium or too many organic substances. If it has more than 15 deg. of total hardness, it is essential to purify it. Practical directions for doing this are given.—*L'Industrie Electrique*, May 10, 1918.

Installations, Systems and Appliances

Switchgear Standardization.—CHARLES C. GARRARD.—Among the subjects discussed are the general principles underlying standardization, standard test pressure for switch and controlling gear, conductivity of current-carrying alloys, specifications for cast brass and gunmetal, millivolt drop at knife-switch contacts, and suggested standards for back connection studs and nuts. The author calls attention to the urgent necessity of standard oil-switch rules in view of the conditions that exist in foreign countries and discusses breaking capacity, the connection between this and the quantity of oil required, the length of break and speed of operation. The millivolt drop at air-break circuit-breaker brush contacts is also considered; short-circuit tests, time element and determination of normal fusing current are subjects discussed in connection with cut-outs. Discussions regarding copper strip connections on switchboards, temperature rise, millivolt drop at bolted contacts, and lightning protective gears, including horn gaps, choke coils and lightning arresters, conclude the article.—*Journal of the Institution of Electrical Engineers*, London, April, 1918.

Rectification of Alternating Currents by the Corona.—The rectification of high voltage is an interesting problem on which some experiments described by J. W. Davis in a recent paper before the American Physical Society shed some light. Pressures as high as 42,000 volts have been rectified by the corona discharge in hydrogen. For a given gas pressure the maximum voltage which may be rectified is approximately proportional to the radius of the outer cylinder, provided that the inner cylinder is small compared with the outer. The rectification is practically perfect, but the efficiency is low, much energy being wasted in the discharge. The voltage at which discharge takes place may be con-

siderably reduced by arranging for the discharge to be started by an incandescent wire.—London *Electrician*, April 26, 1918.

Wires, Wiring and Conduits

Joining Triple-Concentric to Three-Core Cable.—P. WARDLE.—Description of a fitting which is not so bulky as those available heretofore. A 4-in. (10.2-cm.) sleeve will fit over the fitting.—London *Electrical Review*, April 26, 1918.

Heating of Conductors.—G. PERRIN.—A new method of calculating the maximum temperature that copper conductor can reach—an important consideration in the maintenance of insulation. The author, working out a numerical example, claims simplicity and rapidity for his method.—*Revue Générale de l'Electricité*, May 4, 1918.

Electrophysics and Magnetism

Resonance and Ionization Potentials for Electrons in Cadmium Vapor.—JOHN T. TATE and PAUL D. FOOTE.—The two types of electronic impact that take place with mercury also occur in cadmium vapor. The sudden decrease in current through the retarding field at an effective potential of 3.88 volts indicates a loss in energy of electrons having this critical velocity on impact with a cadmium atom. When the velocity of the electron corresponds to 8.92 volts, the collisions again become inelastic, and the sudden increase in the total current indicates that the loss in energy of the colliding electrons has disappeared in separating one or more of the electrons bound in the atom from the nucleus. That the entire spectrum of cadmium is probably radiated at potentials above 8.92 volts is indicated by the appearance of a visible glow around the hot wire at 9.2 volts. McLennan and Henderson were able to get the complete spectrum at about 15 volts. If, following McLennan, we calculate the ionizing potential on the basis of Bohr's theory, using the frequency $v = 1.5S$ of the cadmium spectrum ($\lambda = 1378.68A$) in the above relation, we obtain a theoretical value of 8.97 volts, as compared with 8.92 volts observed. The agreement is within the probable error of the experiment. The results obtained for the resonance and ionization potentials for electrons in mercury and cadmium vapors must be regarded as another very striking example of the fundamental accuracy of conclusions based upon Bohr's theory of atomic structure. Especially is this true of the results of mercury vapor, since for a long time the view that ionization took place at 4.9 volts, together with the known fact that the radiation emitted at that potential was monochromatic, formed a very serious obstacle to the complete acceptance of the theory of atomic structure.—*Paper No.* 317, *Bureau of Standards.*

Evolution of the Thermionic Value.—R. L. SMITH-ROSE.—The author refers to the investigations and findings of Elster, Geitel, Sir J. J. Thomson, Wehnelt, Edison, Fleming, Langnier and others. He concludes by saying that when a metal or carbon filament is rendered incandescent in a highly exhausted vessel there is a continual evaporation or emanation of negative electricity from it in the form of electrons, the rate of such emanation being dependent on the nature and temperature of the glowing filament and on the nature and pressure of the surrounding gas.—London *Wireless World*, April, 1918.

Miscellaneous

The Conservation of Platinum.—The Society of Expert Chemists of France is protesting against the employment of platinum in the manufacture of jewelry and silverware in view of its growing scarcity and its necessity in many manufactures of national importance, among which the electrical industry is prominent. The society desires either that such use be prohibited or that a heavy tax be levied on all articles of luxury containing platinum. In this connection the proposed substitutes for platinum—an alloy of gold and palladium, an alloy of nickel and chromium, an alloy of silicon and iron, quartz in its pure state and stellite—which were recently the subject of a paper read before the American Chemical Society by E. Haynes, are briefly dealt with.—*L'Industrie Electrique*, May 10, 1918.

Corrosion of Condenser Tubes Caused by Salt Water.—G. COSTESÈQUE.—Central stations which get their circulating water from the sea have to contend with the corrosion of the condenser tubes. The author, who is the director of a power house at Marseilles, tells of his experiences during ten years, which show diverse and even contradictory results with identical condensers under the same conditions. He attributes the corrosion to electrolysis and has found that zinc disks through which a light current is allowed to pass have afforded a fair degree of protection.—*Revue Générale de l'Electricité*, May 4, 1918.

Purification of Boiler Water.—W. T. READ.—The article not only deals with the chemical and technical aspects of water purification but also gives, in plain and untechnical language, practical information and instructions for the benefit of those who are not conversant with chemical nomenclature and formulas. It is therefore valuable to every one interested in the purification of water for commercial purposes. Under the headings "Effects of Minerals in Water Used in Steam Boilers," "Common Scales in Boiler Water Supplies" and "What an Analysis Means and What It Does Not Mean," scaling, corrosion and foaming are very clearly discussed. Common chemical ingredients are given and statements are made when to use compounds, objections to compounds, mechanically acting compounds and legitimate compounds. Preheaters, water softeners and filters are also considered, mud and sludge removal, danger of incorrect filtration and coagulants being discussed. Under "Cost, Construction and Operation of Water Softeners" is listed the cost of standard patented water softeners. The variation of cost with size is pointed out. Under "Cost of Chemicals" the calculation of amount of chemicals needed for analysis of water, factors for use with hypothetical combinations and variations in cost of chemicals are given. The necessity for chemical control in an intermittent lime-soda softener is emphasized, and information is given on how to fix feed of chemicals to meet variations in water, use of one constituent to fix amount of chemicals, preparation of a table for amount of chemicals, how to determine bicarbonates, and apparatus and supplies for testing water. The reasons for testing, details of testing treated water and what the results mean are also discussed. The savings effected by water-softening plants, some general facts and some actual saving experiences with the Austin Street Railway Company softener are presented.—*University of Texas Bulletin No.* 1752.

Scientific and Industrial Research

A Department Devoted to Reports of Investigations Contemplated or Completed, Research Facilities Available, and Suggestions for Co-operative Work.

Conducted by PROF. VLADIMIR KARAPETOFF

Cornell University, Ithaca, N. Y.

Investigations Under Way or Completed

(RESEARCH WORK REPORTED SINCE MAY 18)

[When investigations which have been completed are, in the opinion of the editors, of wide enough interest to the field we serve, details thereof will be presented in other parts of this paper. Contemplated research or that which appears to have limited appeal will be only briefly reported in this section, but details may be had by communicating with the investigator or institution named in the report. Readers are referred to the department "Technical Theory and Practice" for investigations reported in other journals. The news and engineering sections should also be followed for research reported before technical societies.]

FUEL CONSERVATION.

One of our larger problems is the conservation of petroleum and its products, as well as natural gas at the same time stimulating production and securing improved transportation to meet increased needs while avoiding waste. In the past eighteen months savings of from 20 per cent to 30 per cent have been effected by study of oil and gas problems and of gas made possible by special apparatus that heretofore was regarded as valueless. The processes now nearing completion in our refineries promise equal increases in fuel saving. We estimate that the work of our technical staff will show a saving of at least half a million dollars of crude-oil fuel in 1918 and nearly an equal amount in refiners.—*H. B. Shaw, with Henry L. Doherty & Company, Toledo, Ohio.*

LIGHTNING ARRESTER, ELECTRO-THERMAL.

The arrester, which is still in an experimental stage, consists of a bakelite tube containing two electrodes, one connected with the horn gap and the other with the ground. Normally the electrodes are connected by water, but when there is a discharge the vapor pressure generated forces the water out through a needle valve, breaking the circuit.—*E. O. Schweitzer, Chicago.*

PORCELAIN FOR SPARK PLUGS.

At the request of the Signal Corps and the National Advisory Committee for Aeronautics, the Bureau of Standards has undertaken a study of ignition problems with special reference to aeronautic engines. The investigation of spark plugs has involved the development of methods of testing the electrical conductivity of porcelain at high temperatures, the resistance to fracture of porcelain insulators by sudden changes of temperature and by mechanical impact, and the gas tightness of plugs at operating temperatures. Investigations of the characteristics of magnetos and other ignition systems are also being made to determine the relative characteristics of the spark discharges produced by the various systems. Much of the work is of a confidential nature and has, therefore, not been made public. A series of porcelains has been produced in the Pittsburgh Laboratory of the Bureau which show high electrical resistance at temperatures above red heat and at the same time good mechanical strength. Thus, at a temperature of 750 deg. C. one body showed a resistance of 1 megohm per centimeter cube.—*Bureau of Standards, Washington, D. C.*

RELAY, PROTECTIVE, ON THERMAL PRINCIPLE.

The relay is provided with a heating element the temperature of which increases in the same proportion as that of the piece of electrical apparatus to be protected. When the limiting temperature has been reached the relay causes the main circuit to be opened. In one form of relay a brass rod wound with asbestos-insulated magnet wire and an insulated casing are used. The expansion of the rod can be made to follow the dissipation of heat in any piece of electrical apparatus. To compensate for eddy currents a threaded iron screw is inserted inside the brass rod, upon which the asbestos insulated wire is wound. The expansive movement of the brass rod is multiplied by suitable levers in order to make and break a contact quickly. The disconnecting apparatus is a new form of polyphase magnet which has one axis for all the three phases and is active either on one, two or three of the phases.—*S. N. Baruch, San Francisco, Cal.*

STEEL, THE INFLUENCE OF HEAT TREATMENT ON ITS SPECIFIC RESISTANCE AND THERMO-ELECTRIC PROPERTIES.

The purpose of the investigation has been to add to the knowledge we have of the specific resistance and thermo-electric properties of steels of varying carbon content when these steels have been subjected to different heat treatments, and to point out the relation existing between specific resistance and chemical constitution, with a view to throwing more light on the underlying causes of hardness in steel. Experimental evidence shows that electrical resistivity in metallic solutions is an analogue of electrical conductivity in aqueous solutions, and consequently really a manifestation of the chemical constitution rather than of the purely physical structure.—*E. D. Campbell, University of Michigan, Ann Arbor.*

TRANSFORMER, SHORT-CIRCUIT, STRESSES.

A transformer under short-circuit was photographed by means of a moving-picture camera, to obtain information as to the process of the actual displacement and destruction of the coils. In preparing the positive of the film each element of the negative was printed ten times in succession, so that on the screen the motion of the coils appears slow enough for direct observation.—*J. J. Frank, Pittsfield, Mass.*

Suggestions for Research

DISTRIBUTION, MINIMUM-COST.

In view of the present high cost and scarcity of copper it would be advisable to make a study of the initial cost and operating expenses of some typical direct-current distributing systems with different distances between converter substations, for example, with substations 2 miles (3.2 km.) apart and again at a distance of 1 mile (1.6 km.) apart. In the first installation fewer generating units though of larger capacity would be required and fewer stations and switchboards. Against this saving there would be a greater amount of copper required in the distributing lines to obtain the same voltage regulation as would be obtained were smaller and more numerous units used. There are many existing installations in which a considerable amount of low-tension cable could be saved by adding more substations. The copper so salvaged could be used to advantage on other parts of the system.—*E. C. Raney, Columbus, Ohio.*

FUSES.

The design of fuses is peculiar in that it is very largely an empirical proposition, there being a number of factors which probably have never been thoroughly and finally analyzed by either the manufacturers or engineers. This is due largely to the fact that the phenomena which take place, especially under severe short-circuit conditions, have so short a duration that they are unusually difficult to analyze. This is a fruitful field for an earnest student and a physicist to obtain definite laws, and to devise testing apparatus both accurate and reliable for practical use.—*Editorial Suggestion.*

FUSES.

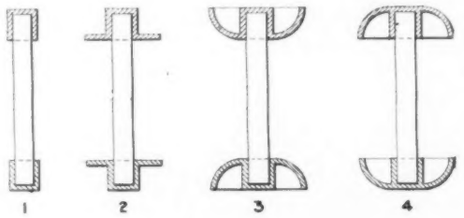
The present holders for refillable fuses being made of fiber cannot be used in mines on account of moisture and atmospheric changes. Therefore research could be profitably carried on with the idea of producing either a material with which the fiber could be treated or a substitute for it.—*P. L. Reymond, Chicago, Ill.*

HEATING OF CONDUCTORS IN SLOTS.

With the increase in the rating of synchronous and induction machines it becomes of more and more importance to strand and otherwise to subdivide the conductors in slots so as to reduce the skin effect and eddy currents. But with a parallel connection of conductors less current flows through the conductors on the bottom of a slot on account of their greater inductance. Various methods have been proposed for the equalization of currents in order to reduce the copper loss and to increase the rating of the machine. It is desired that a systematic study be made of the various arrangements proposed and used from both the electrical and the mechanical point of view. See, for example, R. Richter in the *Archiv für Elek.*, 1917, p. 335, where he proposes to surround with a magnetic circuit the end connections of the conductors on top of the slots so as to increase their inductance and thus to force a proper share of the current through the bottom conductors.—*Editorial Suggestion.*

INSULATORS, ROD TYPE.

Some investigations regarding the effect of different-shaped terminals on the arcing voltage of a rod insulator (see the sketches) would be beneficial. The insulator would in practice have a rod made of wood impregnated with paraffine. For



experimental work, if such a rod was not available, one made of glass, porcelain, solid paraffine or hard rubber would probably do. Fig. 1 shows an insulating rod with close-fitting metal caps on the end, Fig. 2 the same rod with flat disks added to the caps, Fig. 3 a rod with curved disks on the caps, with convex surfaces opposite each other, and Fig. 4 the same thing with the disks reversed. If the minimum arcing distance is the same in all cases, what voltage would it take to arc over the different types of construction? I would suggest that the flat disks shown in Fig. 2 be made of different diameters, so as to determine at what point it would cease to be worth while to increase further the diameter of the disk in order to increase the voltage. The terminals shown on Figs. 3 and 4 could be made both of different diameters and different radii of curvature, and further variation could be made by making cone-shaped terminals. The points on the disks from which the arc starts are also important, as it is desirable to have the arc jump from the outer edges of the disk rather than to follow the surface of the rod.—*H. H. Cochrane, Montana Power Company, Butte.*

LIGHTNING PROTECTION.

Some experiments indicate that the amount of atmospheric electricity which a lightning rod can conduct to the ground may be increased many times by artificially ionizing the air around the point. This artificial ionization may be produced by several known means such as radio-active substances, ultra-violet light, an electric spark, etc. Further laboratory experiments are desired with a view to developing practical arrangements for the protection of oil tanks, powder magazines and similar structures against lightning. The use of some inexpensive radio-active substance seems especially promising.

STARTERS FOR DIRECT-CURRENT MOTORS.

Valuable work could be done in determining the proper number of accelerating points and the relative value of the resistance steps to be used in connection with automatic starters for direct-current motors. Any information that could be tabulated or any empirical formulas that could be devised for this purpose for different makes and speeds of motors would be of considerable benefit.—*H. L. Van Valkenburg, Milwaukee, Wis.*

NEWS OF THE INDUSTRY

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields

ADDITION TO PROGRAM FOR A. I. E. E. ANNUAL CONVENTION

Several Papers Not Previously Announced to Be Presented at the Atlantic City Meeting on June 26-28—Luncheon Conferences

Besides the list of papers announced in the March 16 issue of the ELECTRICAL WORLD for the thirty-fourth annual convention of the American Institute of Electrical Engineers, R. E. Dougherty and O. E. Shirley will present a paper on "Reactance of Synchronous Machines and Its Application," and J. M. Drabelle and L. M. Bonnett will present one on "The Automatic Hydroelectric Plant."

Crosby Field, Ordnance Department, U. S. A., will read a paper on the same subject as that by Dr. C. P. Steinmetz, "The Oxide Film-Fighting Arrester."

At luncheon on the three days of the meeting there will be conferences of Institute officers and delegates of sections and branches. The board of directors will hold a meeting at 5 p. m. on June 26, and in the evening there will be an informal reception and dance. Technical committee reports will be read at the first session, opening 10.30 a. m. on Wednesday.

PLAN OF CONTRACTOR-DEALER CONVENTION AT CLEVELAND

First Annual Meeting of the Association Under Its New Name and Object—All Executive and General Meetings Open to All

The eighteenth annual convention of the National Association of Electrical Contractors and Dealers will be held at Cleveland July 15 to 20 with headquarters at the Hollenden Hotel. Monday, July 15, will be given over to the meetings of the national executive committee, and on Tuesday afternoon there will be meetings of the Atlantic, Central and Pacific divisions.

The convention will be opened at 10 o'clock on Wednesday, July 17, by A. L. Oppenheimer, president of the Electrical Contractors of Cleveland. An address of welcome by Mayor Davis of Cleveland will be responded to by President W. C. Peet. There will also be an address by W. C. Rose, president of the Cleveland Advertising Club. On Wednesday afternoon L. K. Comstock, New York, will present a paper on "Scientific System of Wage Adjustment," to be followed by a round-table conference on the labor cost data, J. N. Pierce being chairman.

On Thursday morning J. R. Strong, past-president of the association, will speak on organization and William L. Goodwin will describe the Goodwin plan. On Friday morning, following reports of the association committees, G. M. Sanborn of Indianapolis will read a paper on "How to Open a Retail Store," to be followed by another paper on "How an Electrical Contractor Can Become a Successful Retailer." The question box will be opened and questions will be answered by Mr. Goodwin.

All sessions of the convention, as well as the meetings of the national executive committee and division meetings, will be open to any one wishing to attend. On all papers read before the convention a free and open discussion is invited.

STEP TAKEN FOR RELIEF OF POWER SHORTAGE IN CALIFORNIA

Utilities Meet with Commission and Agree on Plan Involving Pooling of Power, Priorities and Postponed Financial Adjustment

The California Railroad Commission called together on Tuesday representatives of all power companies now interconnected in the central California group to consider means of relief from the present power shortage.

Mortimer Fleishhacker, Great Western Power Company, after reviewing the causes of power shortage, suggested that the commission prepare a priority list of classes of consumers which would be used alike by all power companies. Paul M. Downing, Pacific Gas & Electric Company, also assured the commission that serious power shortage actually exists and that immediate action is necessary. Either certain consumers must be shut off entirely or the amount of power supplied consumers of certain classes must be reduced. The State Food Administrator and Emergency Fleet Corporation representatives predicted a large increase of power demand for irrigation pumping and ship construction respectively.

The commission then examined power company representatives successively, with the result that each agreed to three general features of a plan for relief; namely, first, pooling all available power; second, apportioning load in accordance with a priority rating to be prepared later, and third, postponing the incidental financial adjustment between companies until the physical results shall have been accomplished.

Representatives of the several power companies, at the commission's suggestion, then and there elected a committee of seven to act with the commission in taking steps to relieve the present crisis in such way as may be deemed best. A. E. Schwabacher, State Fuel Administrator; D. M. Folsom, Pacific Coast Petroleum Administrator, and a representative of the Federal Reserve Bank heartily indorsed the plan and agreed to cooperate. The commission then immediately went into session with the committee of seven, of which the members are: A. Casper, Vallejo Light & Power Company; Samuel Kahn, Western States Gas & Electric Company; John A. Britton, Pacific Gas & Electric Company; Mortimer Fleishhacker, Great Western Power Company; Edward Whaley, Northern California Power Company; H. F. Jackson, Sierra & San Francisco Power Company, and S. W. Coleman, Coast Valleys Gas & Electric Company.

INDUSTRIAL EFFICIENCY AT A. S. M. E. CONVENTION

War Topics Predominate in Important Meeting at Worcester, Mass., Attended by Nearly 1000 Delegates and Guests

American industry is humming with a determination to force the Hun back through efficient co-operation with the men on the fighting fronts. The importance of the engineer's work behind the lines in productive service was emphasized over and over again at the spring meeting of the American Society of Mechanical Engineers held at Worcester, Mass., June 4 to 7, and the influence of the war upon the papers and discussions of nearly 1000 members and guests who attended the convention was apparent at every session. In munitions production, in the efficient use of fuel and in numerous other ways the engineers of America are accomplishing a superb task, whose magnitude could only be hinted at in the crowded hours of the meetings.

The opening session took place on the evening of June 4 at the Hotel Bancroft, greetings being extended by R. Sanford Riley, president of the Worcester Chamber of Commerce, and by Mayor P. G. Holmes of Worcester. A council meeting of the society was held in the afternoon, with President Charles T. Main in the chair. At this session resolutions were discussed relative to the elimination of the alien enemy members of the society, of which there are about 100 out of a total membership of 9000. It was decided to draft suitable resolutions and present them for consideration at the winter meeting of the society in New York.

Regular activities opened Wednesday with a business session at the Worcester Polytechnic Institute. A forty-eight page report was presented by the committee on limits and tolerance in screw-thread fits. This was followed by a report by the committee on weights and measures, a forty-eight page compilation of replies to a questionnaire regarding the use of the metric system by several thousand manufacturing concerns in the United States. The replies indicated that the metric system is not making great progress in this country.

Following the reports, Prof. George H. Haynes, head of the department of economics, Worcester Polytechnic Institute, read a suggestive paper on "The Small Industry in a Democracy." Dr. Haynes emphasized the value of team play to industry, pointing out how it is obtained in small establishments through direct relationship between employer and employee.

President Ira N. Hollis of the Worcester Polytechnic Institute, past-president of the A. S. M. E. and chairman of the New England Fuel Administration's engineering advisory committee on plant economy, made an address on the importance of fuel conservation through co-operative effort.

H. W. Ballou, consulting engineer, Providence, R. I., presented a paper on the "Use of Fuel Oil in New England Power Plants," which gave a statistical tabulation of installations of this type. Within four years sixty plants have adopted fuel for 344 boilers of ten different kinds, totaling 83,000 hp. One-half of these are in Rhode Island. The rapid adoption of fuel oil, the author stated, is due to its superiority to coal in all attributes except possibly that of first cost. Despite the great advantages of fuel oil, the increasing shortage threatens its future use, and the author predicted that in time oil fuel will command a premium for marine use which will commercially debar it from the power plants of New England. In many cases, however, the whole cost of the oil-burning installations will be saved well within a period of five years.

A report of other proceedings of the convention will be published in a later issue.

COAL DEFICIT THREATENS TO CAUSE FAMINE IN FUEL

"We Know the Worst of a Bad Situation," Says the Fuel Administration—Conservation the Only Safe Way

A statement on the critical coal outlook issued by the Federal Fuel Administration on June 10 says in part:

The fuel budget for the season 1918-1919 has been completed by the United States Fuel Administration. We know the worst of a bad situation. A detailed survey of the coal required during the present coal year for war purposes to keep our industries running and for domestic consumers foots up about 80,000,000 tons more than was produced last year. This is the figure on June 1. . . .

It is estimated that the industries not employed on war work will require something less than 100,000,000 tons of coal. All consumers of fuel, war industries and otherwise, must participate in the saving campaign, but non-war industries are especially interested, because whatever the deficiency turns out to be, it will come out of their quota. Hence, the general prosperity of our industries and the full employment of labor will depend upon saving, by economies and prevention of waste, between 50,000,000 and 60,000,000 tons.

In spite of intense efforts to increase the production of coal, the first five months of 1918 have produced only 10,000,000 tons in excess of the same period of 1917. If this is considered in relation to the immense physical task involved in producing 12,000,000 tons of coal per week, it is easy to draw the conclusion that this increased demand of 100,000,000 tons cannot to any large extent be met by increased production. And yet an actual deficit of 500,000 tons would mean a personal privation and an industrial disaster which no one can contemplate with equanimity.

What is the answer? There is only one; it is saving coal. It is the answer Europe has made in a similar situation—saving coal in every possible way and by all of the people.

The Fuel Administration has foreseen the situation represented by these figures and through its conservation division has organized fuel-saving campaigns reaching out into every department of our national life where fuel is consumed.

Fuel economy is receiving intensive study in connection with steam plants and industrial uses. An organization is already in existence provided with engineers and inspectors who will visit every one of the 250,000 steam-producing plants in the country with a view to the improvement both of equipment and firing practice. This is expected to save 20,000,000 tons of coal. The economical use of power in factories will be in the hands of organized shop committees. The power loads of the public utilities throughout the country are being studied with a view to readjustments which will result in large saving.

In many cities the isolated power plants which use an extravagent amount of coal in proportion to the power produced will be urged to obtain more economical power from large producing stations.

The introduction of "skip-stop" schedules on all the street railways is expected to save 1,000,000 tons of coal. The consolidation of ice plants will yield a still larger tonnage. Unnecessary outdoor lighting, including advertising signs and display illumination, will be reduced. Hotels, office buildings, apartment houses and public buildings are being asked to join in rigid economy of light and heat.

Every American citizen will be asked to clean his furnace, keep it in repair and study economical firing. Instructions prepared by the highest authority will be furnished by the Fuel Administration.

If every one joins in this movement from the owner of an industrial plant to the householder with his furnace and cookstove, if indoor and outdoor lighting is reduced to the amount absolutely needed, if houses are not overheated, the furnace dampers properly adjusted and the ashes sifted, it will be possible to save from 50,000,000 to 75,000,000 tons of coal without serious inconvenience to the American people.

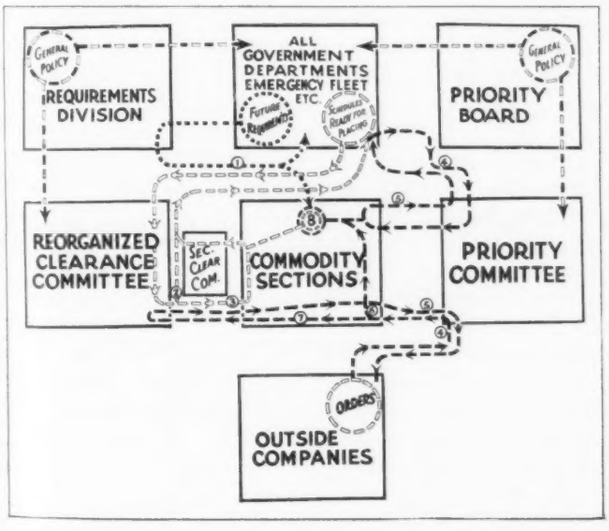
A saving of 60,000,000 tons of coal is the one possible avenue of escape from national disaster. Necessities of war must be supplied. The coal deficit must inevitably come out of the necessary fuel for non-war industries. These industries employ millions of our population and furnish the backbone of our national wealth. Factories will shut down and men be out of work in proportion to the coal deficit. Every ton of coal saved will keep fifty workmen from idleness and permit an additional creation of several hundred dollars' worth of national wealth.

The Fuel Administration has frankly given to the public statistics of an alarming fuel situation. It desires to state just as frankly and with all the emphasis possible that it is in the power of the American people through fuel economy to save the country from the effects of the fuel famine.

ECONOMIZING TIME IN WAR INDUSTRIES BOARD

Diagrams Presented by Walter Robbins Before the Electric Power Club Show the Methods Followed in Washington

Walter Robbins, chief of the power equipment section of the finished products division of the War Industries Board, presented the accompanying diagrams in connection with his remarks on war service work at the annual meeting of the Electric Power Club, Hot Springs, Va., on May 30 to June 1.



INTERRELATION OF WAR INDUSTRIES BOARD DIVISIONS

Here is a key to the numbers on the first diagram:

1. Requirements are presented in person by a representative of the department or organization in interest, who of course learns at the meeting whether they are approved or not. If approved, copies are sent to all commodity sections that may be directly or indirectly interested.

2. If the commodity representative is able to clear at the meeting, the proposal goes back with the representative.

3. When the commodity section having jurisdiction over the article in question is unable to offer immediate clearance, but must arrange clearance by negotiation with outside companies and all other departments whose work might be interfered with, then the requirement is taken back to his office for such study, and when ready for clearance is not again presented at committee meeting, except in special cases, but is passed to the secretary for proper record.

4. Upon reaching priority division the application is numbered and recorded. All correspondence thereafter indicates the application number, the name of the specializing member is indicated upon the application, and it then passes to the proper commodity section for recommendation.

5. Upon return with recommendation the case is reviewed by the specializing member, with the sub-committee on rating, or taken to the meeting of the entire committee as circumstances may warrant.

GENERAL CLASSIFICATION OF PURPOSES DEMANDING PREFERENCE TREATMENT

SHIPS	Including destroyers and submarine chasers.	Including all necessary raw materials, partially manufactured parts and supplies for completion of products.
AIR CRAFT		
MUNITIONS, MILITARY AND NAVAL SUPPLIES AND OPERATIONS	Building construction for Government needs. Equipment for same.	
FUEL	Domestic consumption. Manufacturing necessities named herein.	
FOOD AND COLLATERAL INDUSTRIES	Foodstuffs for human consumption and plants handling same. Feeding stuffs for domestic fowls and animals, and plants handling same. All tools, utensils, implements, machinery, and equipment required for production, harvesting and distribution; milling, preparing, canning and refining Foods and Feeds such as seeds of Foods and Feeds, Binder Twine, etc. Products of collateral industries, such as Fertilizer, Fertilizer ingredients, insecticides and fungicides. Containers for foods and feeds, collateral products. Materials and equipment for preservation of Foods and Feeds, such as Ammonia and other refrigeration supplies including ice.	
CLOTHING	For civilian population.	
RAILROAD	Or other necessary transportation equipment, including water transportation.	
PUBLIC UTILITIES	Serving war industries, Army, Navy and civilian population.	

6. Application may return immediately to priority committee if the commodity section is in position to make immediate recommendation without further investigation or consultation.

7. Original contact with secondary requirements frequently comes through priority application. It is the duty of commodity sections to watch for interferences, and when they cannot be removed by discussion with departments they are taken by the commodity representative on clearance committee to the meeting and then referred with recommendation as shown under No. 5.

8. Very often, upon the original appearance of the requirement clearance, priority recommendation and clearance of the secondary requirements can all be arranged in a single conference between the department or departments interested and affected, the specializing member of the priority committee and the commodity chiefs who may be interested, and procedure is arranged for clearance and for priority action when the priority application or applications actually appear through route No. 4.

MIDDLE WEST SUBSIDIARIES ANTICIPATE RATE INCREASES

Already $400,000 of Increases Have Been Granted, and Applications for $600,000 Additional Are Pending—Scrip Dividend

In mailing its first scrip dividend the Middle West Utilities Company, Chicago, by order of the directors and over the signature of Samuel Insull, president, made a statement of the financial position and future prospects of the company, in part as follows:

The very unfavorable condition of the securities market brought about by government needs makes the raising of funds for the natural necessities of a constantly increasing gross business difficult, even at excessive rates of interest. Directors therefore decided to pay the preferred stock dividend in ten-year 6 per cent interest-bearing certificates. Interest on these is payable quarterly or at such other periods as may be determined from time to time by the directors. The company at its option at any time before maturity may pay the principal with accrued interest then unpaid upon giving at least ninety days' notice. The holder at his option may convert certificates aggregating $100 or any multiple at any time prior to payment into preferred or common stock at par.

In the twelve months ended March 31, 1918, the aggregate gross income of the company's subsidiaries was $1,500,000 greater than for the preceding twelve months. Operating expenses for the same period increased $1,670,000. The increase in gross income for the three months ended March 31, 1918, as compared with the corresponding period of 1917 was $328,000. Operating expenses increased $400,000 for the same period, owing largely to the fact that January was a most unfavorable month for all utilities because of unusually severe weather conditions and the governmental regulation with relation to heatless days. By reason of increased operating expenses the balance over preferred stock dividend will be somewhat less in the annual report for the fiscal year ended April 30 than in the previous fiscal year.

Some of the subsidiaries of the Middle West Utilities Company have already obtained by increased rates for service and by increasing the selling prices of other products increases aggregating over $500,000 per year. The larger part of these increases has not yet been reflected in their earnings. As of January 1, 1918, only $160,000 per annum had become effective, while as of May 1, 1918, this amount was increased to $400,000 per annum.

In addition other subsidiaries now have before the various commissions applications for increases approximating a further amount of $600,000, making increases of rates secured and anticipated amounting in the aggregate to upward of $1,000,000. The management feels that with operating conditions no worse than in the year previous and with the increases now effective and those to be obtained by the subsidiaries within the next few months from applications pending the net earnings of the Middle West Utilities Company for the fiscal year starting May 1 will be satisfactory.

CHICAGO TECHNICAL MEN ARE UNITED FOR WAR WORK

Engineering and Technical Societies in That City Organize a Joint War Committee to Combine Strength and Resources

Representing an effort to co-operate effectively and vigorously for war work, an important joint war committee has been formed by representatives of technical societies centered in Chicago. The movement was started by the military committee of the Western Society of Engineers. As the result the "War Committee, Technical Societies of Chicago," has been organized.

The purpose of this organization is "to enable the technical societies of the Chicago zone to call into play the efforts of the members of the various societies herein represented as occasion may arise, and to co-ordinate their activities in the most effectual manner to help win the war." It is proposed to place at the disposal of the United States government and other authorized agencies the combined strength and resources of the Chicago technical societies for war work as need may arise. The following member societies are co-operating: Western Society of Engineers, Structural Engineers' Association of Illinois, Society of Industrial Engineers, Illinois Society of Engineers, Illinois Society of Architects, American Railway Engineering Association, Swedish Engineers' Society of Chicago, Illinois Chapter American Institute of Architects, Chicago Section American Society of Mechanical Engineers, Chicago Section American Institute of Electrical Engineers, Chicago Section American Chemical Society, Chicago Section American Institute of Mining Engineers, Mid-West Section Society of Automotive Engineers, Illinois Association of American Society of Civil Engineers, Chicago Section American Society of Heating and Ventilating Engineers. Chicago Section American Society of Refrigerating Engineers, Chicago Section Steel Treating Research Society, Chicago Section Illuminating Engineering Society and Chicago Chapter American Association of Engineers.

Officers of the war committee have been elected as follows: Chairman, F. K. Copeland; vice-chairman, W. L. Abbott; secretary, Edgar S. Nethercut; treasurer, William A. Fox.

The executive committee consists of F. K. Copeland, W. L. Abbott, William Hoskins, C. A. Keller, Charles E. Lord, C. F. Loweth, Isham Randolph and Richard E. Schmidt. The address of the secretary of the war committee is 1735 Monadnock Block, Chicago.

HOW TO WIN THE WAR

What we need to do is to speed up. It is not a question of what we must not do but a question of what we must do. We must win the war. We must provide all the arms, ammunition, ordnance, aeroplanes and other equipment that can be transported to Europe, and we must build ships as rapidly as possible.

We must make all the other goods that we can possibly make. We must keep on creating new wealth. We must keep our manufacturing organization in good running order. We must continue to go after foreign trade. And we must prepare ourselves for the intense competition for foreign markets that will occur after the war.

THOMAS A. EDISON.

(Letter read at Edison phonograph convention.)

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month on the next-to-last text page.

N. E. L. A., Connecticut Section.—The fifth annual outing of the Connecticut Get-Together Club of the National Electric Light Association is scheduled for to-day (June 15) at the Momauguin Hotel, Cosey Beach, East Haven, Conn.

A. S. M. E., Indianapolis Section.—L. W. Wallace was elected chairman at the May 10 meeting of the Indianapolis Section of the American Society of Mechanical Engineers. "Heat Losses in Uncovered Steam Pipes" was the subject of discussion.

Engineering Society of Milwaukee.—H. M. St. John of the Testing Laboratory of the Commonwealth Edison Company, Chicago, gave an illustrated talk on "Products of Electric Furnaces and the Cost of Their Production" before the Engineering Society of Milwaukee on June 12.

A. I. E. E., Pittsburgh Section.—At the final meeting of the season of the Pittsburgh Section of the American Institute of Electrical Engineers, on June 11, Major Lyle spoke on "The Department Organization of a Modern Army" and S. Q. Hayes spoke on "Some Recent European Experiences."

Chicago Vehicle Association.—The Chicago Electric Vehicle Section, National Electric Light Association, has elected the following officers for the ensuing year: President, George D. Foster, Commonwealth Edison Company, and secretary-treasurer, E. W. Swift, Commonwealth Edison Company.

Electrical Club of Detroit.—Dr. A. C. Studar talked before the Electrical Club of Detroit at its regular weekly luncheon on June 1 on "The Y. M. C. A. and the War." The June 1 number of *Current Events*, issued weekly by the club, is dedicated to the Detroit Edison Company and called the "central-station edition."

N. E. L. A., Public Service Section.—The June meeting of the Public Service Section of the National Electric Light Association will be held in the assembly room of the Terminal Building, Newark, on Monday evening, June 17, at 8 p. m. There will be an election of officers and a discussion about the different departments.

A. I. E. E., Cleveland Section.—C. S. Ripley was elected chairman and R. K. Knowles was elected secretary at the May 20 meeting of the Cleveland Section of the American Institute of Electrical Engineers. This was the last meeting of the season and was held under the auspices of the committee on co-operation of engineering societies. It was addressed by C. E. Drayer, secretary of the national committee on co-operation.

Synchronous Club of Los Angeles.—"Electric Railways" was the subject of a lecture delivered by L. J. Turley of the Los Angeles Railway Corporation before the June 6 meeting of the Synchronous Club of Los Angeles.

A. I. E. E., Madison Section.—James W. Watson and L. E. A. Kelso of the University of Wisconsin were elected chairman and secretary respectively at the May 27 meeting of the Madison Section of the American Institute of Electrical Engineers. E. R. Shepard of the Bureau of Standards gave an address on "Electrolysis and Mitigation Methods." He first gave a short illustrated talk on the work of the Bureau of Standards.

A. I. E. E., Chicago Section.—The Chicago Section of the American Institute of Electrical Engineers, at its meeting on May 27, elected the following officers for the ensuing year: Chairman, C. A. Keller, and secretary, A. F. Riggs. On June 17 the section will hold a joint meeting with the Western Society of Engineers, at which time there will be a discussion of the economies which can be derived from the use of higher steam pressures.

Empire State Gas and Electric Association, Electric Section.—A meeting of the Electric Section of the Empire State Gas and Electric Association will be held in the Onondaga Hotel, Syracuse, N. Y., on Friday, June 21, at 9.30 a. m. This will be a combined meeting of the electric production and the electric distribution departments, and war-time topics will be discussed. Among these topics will be the labor situation and the substitution of women for men, fuel conservation, 11,000-volt distribution with special attention to connecting transformers and to protection from lightning in connection with rural service, the rear-lot distribution in residence districts, outdoor-substation design and construction, electric furnace operation and its effect on system regulation, and the installation and maintenance of synchronous motors on consumers' premises to improve the power factor on the distribution system.

Ohio Electric Light Association.—As previously announced in the ELECTRICAL WORLD, the twenty-fourth annual convention of the Ohio Electric Light Association will be opened on Wednesday, July 10, at 10 a. m. at the Breakers Hotel, Cedar Point, Ohio. On that day, besides the president's address, there will be a report of the executive committee, secretary-treasurer's report, report of the illumination committee, appointment of committees, report of the station and operating committee. and report of the meter committee. Thursday morning there will be reports from the new-business co-operations committee, the commercial lighting and merchandising section and the industrial power and heating section. In the afternoon James M. Cox, Governor of Ohio, will deliver an address. On Friday there will be a report of the transmission and distribution committee and election of officers. Beecher W. Waltermire, Public Utility Commissioner of Ohio, will speak.

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies.

Discretion of Commission Regarding Rehearings.—Under the Public Service Commission law providing that, on application for rehearing of a proceeding, the commission shall grant and hold such a rehearing if in its judgment sufficient reason is made to appear, the granting or refusing of application for rehearing rests in the discretion of the commission, the New York Supreme Court held (169 N. Y. S. 953).

Rights to Use of Streets.—Where an illuminating and heating company had laid its conduits in a public alley, a contractor, excavating a basement on the land of an abutting owner, had no right to excavate part of the alley so as to cause a cave-in, resulting in injury to such conduits, and was liable for the resulting damage, the Supreme Court of Michigan held in Edison Illuminating Company versus Mich (166 N. W. 944). The requirement in a franchise to a lighting and heating company that it get an express permit to lay its conduits in a public alley, being for the protection of the city, might be waived by it, and failure to obtain such permit constitutes no defense in an action by the company for injuries to its conduits.

Secondary Municipal Franchises.—The right of a public service corporation to hold and enjoy a secondary franchise granted by a municipal corporation and conferring privileges and rights within the limits of the city, town or village that can be exercised only by its permission depends upon the continuous performance of the public duties assumed by the acceptance of the franchise, constituting a condition precedent to such right, it was held by the Supreme Court of Appeals of West Virginia (95 S. E. 6531). On the failure of such performance the right or privilege granted by the franchise terminates, and a court of equity has jurisdiction to cancel the franchise, by way of rescission of the contract between the granting and accepting corporations. A telephone company holding a franchise for the installation, maintenance, and operation of one telephone system in a city, town or village cannot without the consent of such municipal corporation take over by purchase another system constructed by another company under another franchise and operate both systems separately and contemporaneously, nor use the locations of such other system in the streets for wires and other appliances of its own system, nor take the benefit of other privileges granted to such other company, without having acquired its franchise as well as its tangible property.

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

Using Electric Light in Gas Works.—According to an item in a Richmond (Va.) newspaper, the superintendent of the city electric plant in that place is about to wire the gas works in order to permit electricity to be used for lighting them.

Spokane Extension Plans Abandoned.—It is announced that, owing to war conditions, the Spokane (Wash.) Heat, Light & Power Company will not extend its lines into the residential district this year, as had been intended. Minor adjustments and small extensions to hold the present field are to be made, but no new patrons sought.

State Franchise Tax Paid Under Protest.—At the recent convention of the Missouri Public Utilities Association the fact was brought out that a number of companies in Missouri are paying a state franchise tax under protest. It was also stated that this course was followed after a careful investigation had been made and legal counsel secured.

Kansas Rate Increase.—The United Water, Gas & Electric Company, Hutchinson, Kan., has been given authority by the Kansas Public Utilities Commission to add a surcharge of 3 mills per kilowatt-hour to all existing electric power rates and for energy supplied for electric ranges and battery-charging services. This will add 13 per cent to the gross earnings.

Rate Increase Granted in St. Joseph, Mo.—The Missouri Public Service Commission has granted authority to the St. Joseph Railway, Light, Heat & Power Company to increase all lighting rates to 9 mills per kilowatt-hour, which will mean an increase in lighting revenue of $8,000 a month. The appeal for this increase was made two months ago. The company had previously received an increase in power rates.

Air Attack on Power House in the Trentino.—According to the London *Times* a squadron of Italian and British airmen flew on May 4 to Cavedine, which lies to the northeast of Riva (in the Trentino) and dropped such a weight of explosives on the celebrated hydroelectric power house that it will be some time before the supply can be resumed. The central station was actually seen to be destroyed. The raiders flew in four rotating groups, and it is stated that the attack lasted from 8 a. m. till midday. An important effect of the raid, it is said, will be a complete shut-down of the electric railway from Trent up the Val di Sole to Fucine, which is a valuable link in the Austrian army's communications.

Technical Men Needed for War Work.—Those who cannot take part in the actual fighting in France may find an opportunity to help in numerous technical positions under the War and Navy Departments, which are seeking trained men. The army and navy would be powerless without the backing of an efficient corps of highly trained men working in connection with the production of war material. The United States Civil Service Commission, whose duty it is to recruit the civilian army, announces that the government is in urgent need of large numbers of specialists to promote the war program.

Engineering Foundation Board Members.—At a regular meeting of trustees of the United Engineering Society this election was made to the Engineering Foundation Board: Calvert Townley, Westinghouse Electric & Manufacturing Company, New York, succeeding Gano Dunn. The following are additional members: Silas H. Woodard, consulting engineer, American Society of Civil Engineers; Dr. Joseph W. Richards, professor of metallurgy, Lehigh University, South Bethlehem, Pa.; Dr. David S. Jacobus, advisory engineer, Babcock & Wilcox Company, New York; H. Hobart Porter, Sanderson & Porter, consulting engineers, New York.

Course in Radio Communication.—On account of the urgent need of the government for men qualified to render special technical service in the Signal Corps, the University of Illinois will offer a course in radio communication during the summer session of 1918. This course is for men who wish to prepare themselves for research and development work or for field service in the Signal Corps of the army. Instruction will begin Monday, June 17, and will continue until Aug. 9. The assigned work will require the full time of the student registering. University credit of eight semester hours will be granted those who successfully complete the work. This course is planned for those who have completed two years of work in the College of Engineering of the University of Illinois or the equivalent. It is especially important that those who register should be well grounded in physics and in mathematics, including differential and integral calculus. The physical and mathematical theories underlying the phenomena of radio-telegraphy and radio-telephony will be presented in the class room through lectures and recitations on assigned work and through experiments performed in the radio laboratory. Use will be made of information furnished by the government concerning radio apparatus used in the army at the present time. In addition to the radio apparatus belonging to the university, there is available apparatus which has been loaned by the government for instructional purposes. For this reason the course is open only to citizens of the United States, and each one registering will be expected to take oath before a notary public binding himself not to misuse in any way information which may be received.

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities.

Rate Increase in Illinois.—In allowing the Alton Gas & Electric Company to increase rates the Illinois Public Utilities Commission holds that where a utility has abandoned its steam generating plant and purchases electrical energy from an affiliated company under a contract entered into prior to the increase in operating expenses, the purchase price will not be accepted as the rate base to the exclusion of the increased costs. In view of the facts of the particular case, the commission adjusted rates to meet increased operating expenses without requiring a valuation of the property where the utility had abandoned its generating plant and purchased its energy from an affiliated company.

Deposit for Service.—According to an opinion of Commissioner Corey of the Oregon Public Service Commission, the Portland Railway, Light & Power Company can no longer compel patrons of its electric lighting service in Portland to sign a three-year contract for service or a one-year contract with a deposit of $3 attached. The commission holds that no more than a sum sufficient to furnish adequate security for the credit extended may be legally exacted. The commission believes that a deposit equal to the estimated maximum sixty-day bill is justified, or that a satisfactory guarantee should be asked. After a cash deposit guaranteeing payment for metered service has stood unimpaired for twelve months, thus reasonably establishing credit, the deposit should be returned with interest, according to the decision of Commissioner Corey.

Crossing Railroad Property.—A decision of the Pennsylvania Public Service Commission affecting the Butler Light, Heat & Motor Company says that the public service law is regulatory and not designed to enlarge powers of public service companies. The applicant proposes to furnish its product to a coal-mining operation, which necessitates crossing the tracks and property of the protesting railroad company. The crossing proposed consisted of eight high-voltage wires carried on wooden supports over the property of the railroad company, on which are four tracks and admittedly heavy traffic. The railroad company protested, alleging that the electric company was not authorized by law to cross its tracks, and that the crossing in the manner proposed was dangerous for its operations. The commission held that the crossing at the point and in the manner proposed was dangerous to the traveling public and beyond the power vested in the electric company by its charter.

Men of the Industry

Changes in Personnel and Position—Biographical Notes

Herbert Bellamy, president-elect of the Iowa Section, National Electric Light Association, is secretary and manager of the electric light department of the Marion County Electric Company, Knoxville, Iowa. This company and its predecessors were organized by Mr. Bellamy's father in 1887 as one of the first electric utilities in Iowa. Mr. Bellamy was graduated from Cornell College, Mount Vernon, Iowa, in 1906 and since that time has

HERBERT BELLAMY

been almost continuously engaged in public utility work at Knoxville, where his company has not only the electric light and power utility but also the telephone company.

William A. Magee, Pittsburgh, Pa., has been appointed a member of the Pennsylvania Public Service Commission. Mr. Magee was formerly Mayor of Pittsburgh.

Dr. A. E. Kennelly of Cambridge, Mass., acting head of the department of electrical engineering at the Massachusetts Institute of Technology, has been commandeered by the authorities in Washington for special work during the summer months. His position is that of civilian liaison officer to the Signal Corps, and his duties will be in line with his special attainments. He will be away from the institute during the summer months, but expects to report back in the fall. In his absence Dr. F. A. Laws will care for the direction of the special school for radio-engineers.

M. K. Arenberg, formerly a specialist in the supply department of the General Electric Company, who completed a course at the United States Naval Training Station, Great Lakes, Ill., after passing an examination was made chief petty officer in the United States Navy. Two months ago he was sent to the officers' material school, where he was commissioned as an ensign. He is at present under orders to report to Annapolis for a four months' course of training. Mr. Arenberg was also formerly in the employ of the Ilg Electric Ventilating Company, Chicago, as a ventilating engineer.

Oscar S. Straus has resigned as chairman of the Public Service Commission for the First District of New York to become associated with the National Food Administration at Washington, where he will investigate sugar costs and profits.

Charles H. Smith, an engineer of the executive department of the Westinghouse Electric & Manufacturing Company, has received a commission as major in the Reserve Engineers and has gone to Camp Lee to enter the engineering school, where he will receive further instruction. Major Smith is a veteran of the Spanish-American war, in which he served as a captain.

F. F. Espenschied has resigned as assistant engineer for the Hydro-Electric Power Commission of Ontario to become connected with the Combustion Engineering Corporation, New York City. Prior to going to Canada he was general manager of the Interstate Light & Power Company, Galena, Ill., having formerly been engineer with the West Penn Power Company at Connellsville and Pittsburgh, Pa. Mr. Espenschied was graduated from Cornell University in 1905 in mechanical engineering.

Hugh H. Harrison, who has been president of the Merchants' Heat & Light Company of Indianapolis for the last four and a half years, has resigned, effective at once. For fourteen years prior to his association with the Indianapolis company he was engaged in organizing and financing utilities. He was interested in street-railway companies in New Jersey, and it was largely through his efforts that the Imperial Electric Light Company of St. Louis, the Scranton Electric Light Company of New Jersey, and the Lackawanna Electric Light Company and the Baltimore Electric Light Company were organized and financed.

George Wilbur Hubley, who for the last two years has been general manager and chief engineer of the Merchants' Heat & Light Company of Indianapolis, has resigned to become general manager of the elevator department of the Badenhausen Company of Philadelphia and New York City. His early years in the electrical field were spent with the Westinghouse Electric & Manufacturing Company and also with the Citizens' Traction Company of Pittsburgh, Pa. For twenty years he was chief engineer and superintendent of the old Louisville Lighting Company and its successor, the Louisville Gas & Electric Company, from which he resigned to join the electrical engineering staff of the Jones & Laughlin Steel Company of Pittsburgh.

Major J. O. Mauborgne, who has been in charge of the electrical engineering section of the Signal Corps since March 1918, was born in 1881 in New York City. He was graduated in 1901 from the College of St. Francis Xavier and recommended to the War Department as standing highest in the military department upon graduation. Two years later he was commissioned second lieutenant in the regular army, and he was promoted to first lieutenant in April,

J. O. MAUBORGNE

1909. He was graduated in 1910 from the Army Signal School at Fort Leavenworth, Kan., and for the next three years was instructor there in radio-telegraphy and other branches of engineering and in charge of the electrical laboratory. During 1914 and 1915 he was in charge of the army radio construction work in the Philippine Islands, and from October, 1916, to October, 1917, he was on duty at the Fort Leavenworth Army Signal School, acting as its director from October, 1916, to May, 1917. He was promoted to captain of the Signal Corps in September, 1916, and to major in August, 1917. Since October, 1917, he has been on duty in the office of the chief signal officer of the army. Major Mauborgne has had ten years of experimental work in radio-telegraphy and is the author of "Practical Uses of the Wave Meter in Wireless Telegraphy, 1914," and articles on radio research in the ELECTRICAL WORLD, the London *Electrician*, etc. He is also a member of the advisory board of the invention section, War Plans Division, General Staff, U. S. A.

Obituary

Zachary Taylor Underwood, aged seventy-one, an associate of Thomas A. Edison, when the latter was a telegraph operator in Louisville, is dead.

Oran O. Rider, assistant to the general superintendent of the Public Service Company of Northern Illinois, died at his home in Oak Park, Ill., on June 9, following an illness of more than a year. Mr. Rider was forty-seven years old.

TRADE & MARKET CONDITIONS

News of the Trade for the Manufacturer, Wholesaler and Jobber of Electrical Equipment and Supplies— Notes on Industrial Activities and Business Methods

FEDERAL CHILD LABOR STATUTE DECLARED UNCONSTITUTIONAL

Supreme Court of the United States Holds that the Law Invades the Right of States to Control Internal Affairs

On June 3 the Supreme Court of the United States handed down a decision holding the so-called child labor law, which went into effect the first of last September, unconstitutional. The court declared that the law unwarrantably invaded the rights of the states to control their own commerce. Friends of the statute, which prohibited the shipment in interstate commerce of the products of child labor, had worked fifteen years for its passage by Congress. Justice Day, who wrote the prevailing opinion, said in part:

"Is it within the authority of Congress in regulating commerce among the states to prohibit the transportation in interstate commerce of manufactured goods the product of a factory in which, within thirty days prior to their removal therefrom, children under the age of fourteen have been employed or permitted to work, or children between the ages of fourteen and sixteen have been employed or permitted to work more than eight hours in any day or more than six days in any week, or after the hour of 7 o'clock p. m. or before the hour of 6 o'clock a. m.?

"To sustain this statute would not be, in our judgment, a recognition of the lawful exertion of Congressional authority over interstate commerce, but would sanction an invasion by the federal power for the control of a matter purely local in its character and over which no authority has been delegated to Congress in conferring the power to regulate commerce among the states.

"We have neither authority nor disposition to question the motives of Congress in enacting this legislation. The purposes intended must be attained consistently with constitutional limitations and not by an invasion of the powers of the states.

"The far-reaching result of upholding the act cannot be more plainly indicated than by pointing out that if Congress can thus regulate matters intrusted to local authority by prohibition of the movement of commodities in interstate commerce all freedom of commerce will be at an end, and the power of the states over local matters may be eliminated, and thus our system of government be practically destroyed."

Regret over the decision was expressed by the large number of people interested in this class of legislation. A new campaign for a child labor law to meet the Supreme Court's objections, it is understood, will soon be inaugurated in Washington. The law affected jobbers as well as manufacturers.

CONFERENCE TO STANDARDIZE CATALOG SIZES AND PAPER

Meeting in Chicago Adopts Regulatory Resolutions —Convenience and Economies Are the Objectives Aimed At

At a catalog conference of the standardization committee of the National Association of Purchasing Agents on May 22, at the Hotel La Salle, Chicago, it was recommended that all catalogs meant for the use of purchasing agents be 7½ in. by 10⅝ in. in size.

Resolutions were also unanimously adopted to the effect that (1) catalogs be standardized to 6 in. by 9 in., or 7½ in. by 10⅝ in., or 8 in. by 11 in.; (2) sizes of paper, 25 in. by 38 in., or 32 in. by 44 in., or 33 in. by 46 in., with their double sizes; (3) weights of paper, 40, 45, 50, 60, 70 and 80 lb. on the basis of 25 in. by 38 in. It was recommended that printing colors be limited to white and natural. It is stated that the standardization adopted will release 30,000 people from the printing industry and save much paper.

W. L. Chandler of the Dodge Sales & Engineering Company, Mishawaka, Ind., chairman of the committee, explained the necessity for and advantages of standard catalog sizes. The size previously selected by the association, 8½ in. by 11 in., did not meet with favor.

GOVERNMENT DISCOUNTING LARGE PART OF ITS BILLS

General Engineer Depot Reports All Bills Not Subject to Cash Discount Paid Within Thirty Days from Date of Service

Since so much of the business of electrical manufacturers and jobbers is with the government at the present time, it is interesting to note the promptness with which payments are made. A report from the finance division of the General Engineer Depot of the army, which purchases vast quantities of electrical goods, states that for the six months ended April 30, 1918, the saving made by the division through cash discounts amounted to $166,256.03. From May 1 to 15 inclusive cash discounts earned were $34,144. Many of these discounts were on material the price of which had been fixed by the government. All bills other than those subject to cash discount were paid within thirty days from date of invoice.

DISTRIBUTION OF STEEL PRODUCTS BY WAR BOARD

Agreement Entered Into with the Manufacturers— Government Virtually Commandeers the Industry

By an agreement entered into on June 6 between the War Industries Board and the American Iron and Steel Institute the government takes over absolute control of the distribution of all manufactured steel products and pig iron. Under the agreement the War Industries Board must pass upon all applications for the release of steel products and pig iron, thus giving it absolute control of the industry. It amounts to a commandeering of the output of all mills by the government and approaches closely government operation of the industry. A preference list is contained in the announcement and the requirements of the industries named on it must be met before other applications are satisfied.

The committee on steel and steel products of the American Iron and Steel Institute and the War Industries Board have agreed that no pig-iron or steel manufactured products shall be shipped or delivered, except as follows:

"(1) By priority certificates issued by the priorities division of the War Industries Board; or

"(2) After priority certificates shall have been issued or filed, then producers of pig iron and of steel manufactured products may utilize such raw materials and manufacturing capacity, if any, as they may have available to fill orders of their customers not covered by priority certificates, provided that such orders are embraced within the schedule of purposes entitled to preference treatment as determined by the Priorities Board."

No branch of the electrical trade is mentioned in the list promulgated by the board, which is confined strictly to war or collateral and essential activities. However, it is well known that a very large portion of the industry is now engaged in some fashion in war work. In very many instances the war work takes up the major portion of the concern's facilities. Inasmuch as apparently authentic reports state that war work will utilize 100 per cent of the steel output for many months, all steel shipments for some time will have to be made on priority orders. In order to secure these priorities the manufacturer, it seems natural, must have work of a priority nature.

THE WEEK
IN TRADE

THE outstanding fact of the week was the recent increase of prices on practically all electrical material. The cause for this action on the part of the producers is variously ascribed, but the main reason is said to be the higher freight rates which become effective June 25. The 25 per cent advances add to the price of material and the costs of manufacturing, to which the shortage of labor and the greater wage scale also contribute. So far the Eastern territory is the first to experience the advances.

Electric fans are running low in supply in the East, where the warm weather has nearly cleaned out stocks, according to authenticated reports. Other parts of the country are not feeling this pressure as yet, and possibly a readjustment of stocks not needed may bring relief in districts not so fortunate. Shipbuilding and other industrial enterprises for the prosecution of the war are being carried on and extended along liberal lines in the Pacific Northwest, with an accompaniment of strong calls for equipment and other electrical material. Heavy motors are being purchased by the larger industrial corporations in the Southeast. In some sections the demand for rubber-covered wire of various grades has increased 100 per cent. The position of conduit is not improved and stocks are scant. The movement of sewing and washing machines is hampered by transportation delays, and on both an increase of price is announced by the manufacturers. As an authority phrases it, the electrical trades are tied up with federal orders and are turning business away. Perhaps this may also have a bearing on the anomalous price situation.

On the whole, collections are stated as constantly becoming better, regular settlements not being deferred. This promptness is due to the enforcement of short credit arrangements, with a tendency toward still further tightening.

NEW YORK

Following the price changes announced last week to a 10 per cent higher level on machinery came an increase, ranging from 10 to 15 per cent, on nearly the entire line of staple materials. Jobbers in this territory were somewhat surprised, but after a study of various trade tendencies regarding labor, material and transportation difficulties and the quick transformation of general mercantile affairs under war pressure it was realized that the market for electrical goods is in a natural state of ferment.

Other industries are going through the same experience. Foresighted distributers who operate on a large scale look for still further advances. They also admit that manufacturers are hampered in their activities, and consequently the obstacles against a free movement of merchandise are growing greater. In fact, reports say that some manufacturers refuse to quote prices and accept orders only on the basis of such prices as may prevail at the time of shipment. Sales have not diminished. On the contrary, the volume of commercial trade has swollen, with government orders continuing to dominate the market. Jobbers are contemplating the employment of girls as a house sales force to fill the place of men taken for military service.

Collections are better than for some time with the majority of jobbers and distributers. Manufacturers who have heretofore stated that customers were not prompt are now of a different opinion.

FANS.—Predictions regarding the status of electric fans are being realized sooner than expected. The supply in the hands of jobbers is rapidly decreasing, and one of the largest distributers frankly admitted that with one more week of warm weather now it would be impossible to replenish stocks. This concern has been revising its prices for a month past, and on June 8 put out a new fan price list which on some numbers shows an increase of 20 per cent to dealers. It further stated that not a 16-in. fan was in stock and that none were to be had.

DOMESTIC APPLIANCES.—An advance of $1 apiece on sewing machines was announced by a Western manufacturer, to become effective in the East at once. Distributers are in a quandary whether this should be passed along to the trade and the ultimate consumer or a reduction of profit at the primary source be accepted. At any rate, deliveries are so uncertain as to be hampering all around. This is also true of electric irons from Middle West plants. A Western manufacturer of washing machines has added 15 per cent to the selling price of his products. The demand for vacuum cleaners is brisk and the supply is apparently adequate.

SOCKETS AND RECEPTACLES.—The increase on all porcelain goods ranges from 10 to 15 per cent. It went into effect about two weeks ago. The new prices formulated by jobbers and distributers reflect these quotations. These figures also apply to fuse plugs and all schedule material.

SWITCHES.—An advance of 10 per cent was made within the last few weeks on all standard pendent switches. Stocks are none too strong.

COLLECTIONS AND CREDITS.—While in some quarters collections are reported as slowing down, elsewhere reports say that dealers and jobbers are paying bills promptly. Credit men are not relaxing their vigilance when accommodations or extensions are sought in the settlement of accounts.

CONDULETS.—One manufacturer in sending out a new discount sheet recently tightened the figures quite sharply on certain quantities. He also stated that quotations were f.o.b. factory with no freight allowance.

BATTERIES.—One of the largest manufacturers has made an advance of 10 per cent on his line. Others report all the business they can handle but no recent change in their prices.

HEATING APPLIANCES.—An authority states that it is likely the fall demand for electric heating appliances, radiators, etc., will be quite heavy. Gas companies are already sending out warnings of a probable shortage of gas next winter due to a possible curtailment of fuel. In that event electric fixtures will be called upon to meet the deficiency.

LAMP SHADES.—Flat plain and flat fluted porcelain shades were marked up 10 per cent, effective June 1. Steel-enameled shades were also increased in price at the same rate on that date.

LAMP GUARDS AND BELLS.—Exceptions to the long list of advances on staples recently formulated exist in the case of lamp guards, electric bells and flashlamps.

CONDUIT.—Flexible non-metallic conduit advanced 5 per cent about June 1. Some special brands of conduit were placed on a 10 per cent higher level. Stocks are very low and in certain lines are practically unobtainable.

RUBBER-COVERED WIRE.—As noted last week manufacturers increased rubber-covered-wire prices 2½ to 3 per cent. Some jobbers in their new price lists make it 10 per cent to dealers. This applies to both single-braid and double-braid solid in the standard numbers. On stranded double-braid the cost is higher, reaching 20 per cent in some instances. Discounts range from 60, 5 and 2 to 65, 10 and 5 per cent on bare wire, cable and weatherproof, according to the quantity involved and to the negotiation and credit rating of the buyer.

CHICAGO

The past week might well have been called "conduit week" in Chicago. The market was especially active. This can be attributed to the increase in freight rates and the increase in the price of conduit itself. Motors were also active. The news was given out at the Chamber of Commerce that Chicago is to have a shell plant costing $6,500,000, and every one is now anxiously watching for an opportunity to supply goods for this project. Building activities in general are still lagging behind. It is encouraging, however, that electrical construction, while also behind last year's figures, is not lagging so markedly as building generally. This is due to the activity of the contractors in securing old-house-wiring business. A threatened strike of electrical workers against the city of Chicago did not materialize. Credit conditions remain especially favorable.

In the freight-rate situation the jobbers see considerable advantage accruing to the jobbing business in general. When the new rates become effective it will be the exception rather than the rule when it is economical for a customer to order direct from the factory.

WASHING MACHINES.—A survey of the washing-machine manufacturing field in the Central West shows that many of the factories are from 2000 to 3000 behind in production of the dolly type. This means that these factories are about one month behind on deliveries. There is said to be no sign of let-up in orders. Many of the orders originate with the government. These factories are increasing their output as rapidly as possible.

COPPER WIRE.—This has been an active week in copper wire. There was no change in price.

PUSH-BUTTONS.—The market on push-buttons is better than it has been in many months. To the equipping of new offices and the installation of time-saving buzzer systems credit is given for this increase.

DIRECT-CURRENT METERS.—Meters of this type are in strong demand, some factories having more than they can take care of.

CONDUIT.—Non-metallic conduit advanced about 10 per cent and metallic conduit between 5 per cent and 10 per cent. The conduit market was especially active, but the jobbers report they are still able to obtain about enough conduit to "get by." The advance in conduit is not at all unexpected, in view of the increased freight rate. In making conduit about five tons of raw material have to be shipped to get one ton of conduit ready to sell. On this basis alone an increase of 12½ per cent would be justified.

FANS.—While fans were active last week, cool weather has slowed up their movement in the immediate vicinity of Chicago this week.

CABLE COMPOUND.—Maintenance work of central stations, which must of necessity be done, is keeping up a steady and satisfactory market on this product.

BOSTON

The volume of trade holds up well, although business is somewhat irregular between different jobbers as to amount. Stocks are well filled in most lines, although slow deliveries are the rule on railroad shipments. Prices are holding firm, with an advance of about 10 per cent on BX conduit and about 20 per cent on non-metallic as of June 6. Retail sales are very good, one large house reporting a greater business over the counter in May than in any other month since last December. Green labor is causing some annoyance in office work as well as in industrial plants, but this condition is likely to improve soon. Edwin C. Lewis, Inc., Boston, has been awarded a contract for the electrical installation to be made at the quartermaster's terminal at Boston. This is said to be the largest electric wiring and supply contract ever placed in New England. It will total between $1,500,000 and $2,000,000, including lamps, wire, switchboard panels, hoists, motors and other equipment. Improved labor conditions are noted as regards relations between manufacturers and employees. A basic agreement for future negotiations is reported between the Pittsfield works of the General Electric Company and the various unions concerned in recent conferences with the federal labor authorities.

APPLIANCES.—Washing machines and vacuum cleaners are moving well. Deliveries are somewhat unsatisfactory, owing to railroad congestion, but the volume of sales is excellent, and so far demands are being met without widespread difficulty.

POLE-LINE MATERIAL.—This material is quiet at present, and one large jobber reports being heavily overstocked. Extensions of central-station service are few and far between, except here and there for war work off the limits of existing lines.

LAMPS.—New England storage supplies suffered a heavy loss by last week's fire in the South Boston warehouse of the General Electric Company, which contained about 1,000,000 lamps, mainly of 25-watt to 60-watt sizes. About 700,000 lamps were ruined, but vigorous efforts are under way to make good the loss. The East Boston and Lynn factories are being pushed to create a new supply, and extensions of the former, combined with available storage facilities, have made it possible already to minimize the disturbance to local distribution. Retailers still report a shortage of miniature and candelabra lamps.

FANS.—Cool weather holds back the expected rush sales. Dealers are well prepared for the summer drive, and jobbers have received large shipments from the factories.

MOTORS.—The demand continues substantial, especially for use on machine tools in army and navy work. Tool manufacturers are finding it difficult to make punctual deliveries, even to the government; but it is not thought that the motor manufacturers are responsible for this condition.

CONDUIT.—Stocks continue to be rather spotty. On the whole, there is not any too much conduit of the larger sizes in sight. Deliveries are running longer than is satisfactory, and the government is looking sharply into the matter of checking priority orders back to their source, with a closer control of actual pipe movement than has previously been noted.

ATLANTA

Activity in all lines is well sustained this week. Staples are moving briskly and the volume continues to grow. The jobbers in this section are taking more interest in activities now going on at coastal and shipbuilding centers.

On the whole, the jobbers were slow in perceiving the big business latent in connection with shipbuilding, but the outlook has changed considerably of late and they have awakened to the potentialities of this type of industry. Already some lucrative sales in marine and associated supplies have been made, and stocks are being replaced, anticipating a growing demand for this material. Deliveries have naturally been good as the greater portion has the benefit of priority shipment.

POLES.—There is a big demand for poles of all descriptions. Jobbers are finding it more difficult each day to handle orders which exceed the supply. In the face of these conditions it is singular that the price has remained the same for some time.

CROSS-ARMS.—The increasing fir requirements of the government have certainly affected the supply of cross-arms, and local jobbers are having a hard time trying to supply a part of the demand.

PINS.—Deliveries are long and only small quantities are available from time to time. Ordinarily prices are stable, but some wide variations have been noted lately in isolated cases where the need was urgent.

HARDWARE.—Call from the central stations has fallen off considerably, and although the government is absorbing large quantities, the volume of transactions at this time is somewhat below that recorded in the past few months.

INSULATORS.—All sources report that the demand appears to be increasing, with a corresponding scarcity. Deliveries are bad and jobbers are endeavoring to satisfy their customers by a distribution of less carload lot shipments.

CONDUIT.—There is no surface evidence of any material change in price, if any, in this line. The arrival of isolated

shipments has tended to balance the stock of all sizes, but the demand is well over replacement and stocks are gradually getting lower. If this condition exists for a protracted period, there is no doubt that Southeastern stocks will be eliminated, at least until such time as government takings are replaced through priority shipments. One jobber predicts a decrease in demand from normal commercial channels while the manufacturers are supplying government needs.

SEATTLE

Wholesale and retail business continues active, although the volume for the week showed no increase over the past week. The sales of large power apparatus have been light for the past ten days, but several orders of considerable size will be placed shortly. Conduit, wire, cable, lamps and small motors to shipyards and allied industries showed a decrease in movement. Retailers report a slight increase in the sales of wiring devices, wire, lamps, fixtures and the like.

Shipbuilding activities—work on the proposed plants, extensions to established institutions and the award of new contracts—still dominate business conditions in the Northwest. The immediate construction of a large wooden shipbuilding plant in South Bend, Wash., is announced. A plant for the construction of concrete barges, lighters, tenders and towboats up to 1500 tons capacity is started in Vancouver, Wash. Additions of considerable proportions have been begun on two Seattle steel plants and a steel and wooden shipyard in Vancouver, Wash. Two industrial plants closely allied to shipbuilding, engaged in boiler and ship machinery manufacture, one in Seattle and the other in Portland, are making large extensions. A Portland plant has secured contracts for six more ships from the Emergency Fleet Corporation.

Reports from various Northwest cities show that building is still on the increase. This is particularly true in Seattle, Tacoma and Puget Sound cities. Portland reports the issue of building permits to be the highest in five years. However, the large portion of the money expended is for new residence construction, although the building of business buildings, hotels and apartments is showing a decided increase. An authority states that the construction of new buildings in Portland at the rate of 4000 per year is necessary to care properly for the increasing population due to new war industries. Seattle builders anticipate a still more serious need of accommodation for war workers and are enlarging and rushing the building program. Astoria, Ore., under the leadership of the port of Astoria, is preparing to erect housing facilities for 5000 families. Contracts for between 400 and 600 residences, three or five large apartments and an enormous hotel for the Puget Sound Navy Yard, Bremerton, Wash., will be let in about ten days by the Seattle office of the Bureau of Housing.

Collections are reported satisfactory and in harmony with sales. New credits placed during May were larger in number than for the preceding month. However, the extension of credit rather than new credit predominates by far.

SAN FRANCISCO

The past week's business is recorded as being unusually good. Orders reported cover generous quantities of all electrical staples and industrial specialties and some stock orders for electrical appliances.

San Francisco building permits for May total $805,000. An enormous amount of new building was reported during the week. The Santa Fé is greatly enlarging its car shops and terminal facilities at Bakersfield. New rice mills are reported for Woodland and West Sacramento. Important additions to the California Hawaiian plant at Crockett are announced, and educational institutions are represented by a three-million dollar addition to the University of Southern California and by purchases of one, two and three-room portable schoolhouses for various Arizona districts. Warwork industrial plants which are adding to their equipment are the Southwestern Shipbuilding Company at San Pedro, ten new building berths for the Bethlehem Shipbuilding Corporation in Alameda and a Stockton tractor plant.

RUBBER-COVERED WIRE.—Sales are continually increasing, and new shipments are gobbled up almost as received. This is especially true of larger sizes, such as 0 and circular-mil sizes, which have increased nearly 100 per cent in their sales over those last year owing to long runs of big energy supplies in the shipyards.

LAMP CORD.—Sales have decreased about 50 per cent in comparison with those of last year, although there are big sales for deck cables, slicked reinforced cords and the like. Sales of lamp cords standardized in fixture use, such as single light 18 or parallel 18, have dropped to practically nothing.

FANS.—Export orders continue. Local shipments on contract orders have been about completed.

LAMPS.—Some big orders for industrial and power plants are reported during the past week.

FUSES.—There have been several large government orders for refillable fuses and extra refills. One cause for the number of standard fuses that are sent to the shipbuilding plants seems to be that work is such that certain fuses blow at very frequent intervals.

HEATING MATERIAL.—The officers' quarters at the Benicia barracks have been equipped with electric ranges and further government work is in sight. The owners and operatives of Camp Curry, in the Yosemite Valley, are enthusiastic over the hotel-type electric range installation, consisting of two 22-kw. ranges, one 25-kw., 180-loaf bake oven, one 9-kw., 18-in. by 54-in. griddle and one 3-kw., sixteen-slice toaster. The rate for electricity for cooking purposes will be 0.8 cent per kilowatt-hour. Energy is to be furnished from the government plant.

METAL MARKET SITUATION

Price of Copper Now Satisfactory and No Further Advance Advocated—Increases on Wire

At a meeting of the leading copper consumers held last week in New York, at which fully fifty firms were represented, the opinion prevailed that the present official price of the metal, 23.50 cents in car lots and over, was fair to all interests. Not only will a sufficient output be forthcoming, but the situation when the price term expires on Aug. 15 will be one to justify no increase in that figure then. One large distributer said deliveries of copper were behind from forty to sixty days, and that it may be longer when the order is finally obtained.

The War Industries Board on June 6 declared that wherever war requirements have created a scarcity of supplies its price-fixing committee would name a price for the commercial consumer that would be reasonable. On the list of these more essential commodities are finished cotton, copper and steel as employed by the electrical trade. Bare copper wire for electrical purposes—carloads, mill shipment—on June 3 was quoted 26½ cents base per pound. The advance is attributed to increased overhead, labor cost and additional costs for affiliated materials.

NEW YORK METAL MARKET PRICES

	June 3	June 10
Copper:	£ s d	£ s d
London, standard spot	110 0 0	110 0 0
	Cents per Pound	Cents per Pound
Prime Lake	Govt. price 23.50	Govt. price 23.50
Electrolytic	Govt. price 23.50	Govt. price 23.50
Casting	Govt. price 23.50	Govt. price 23.50
Wire base	26.25	26.25
Lead, trust price	7.00	7.25
Nickel, ingot	40 00	40.00
Sheet zinc, f.o.b. smelter	Govt. price 15.00	Govt. price 15.00
Spelter, spot	7.40 to 7.50	7.60 to 7.65
Tin, Chinese*	.86	.90
Aluminum, 98 to 99 per cent.	Govt. price †33.00	Govt. price †33.00

OLD METALS

	Cents per Pound	Cents per Pound
Heavy copper and wire	21.50 to 22.00	21.50 to 22.00
Brass, heavy	13.50 to 13.75	13.50 to 13.75
Brass, light	10.50 to 11.00	10.50 to 11.00
Lead, heavy	5.75 to 6.00	6.00 to 6.25
Zinc, old scrap	5.50 to 5.75	5.75 to 6.00

*No Straits offering. †In 50-ton lots or more; carload, 33.10 cents per lb.; 1-ton to 14-ton lots, 33.20 cents per lb.

Current Prices of Electrical Supplies

New York and Chicago Quotations

THE prices quoted are those prevailing in standard packages of specified lots on apparatus and appliances in Eastern and Middle West markets at the beginning of business on Monday of this week. They are in all cases the net prices or prices subject to discounts from standard lists of contractors, central stations, dealers and others engaged in the resale of such goods.

Prices in Southern and other nearby markets will rule about the same as those in the Middle West, although slight modifications to cover increased freight and local demands should be expected. In the Far West and on the Pacific Coast the prevailing prices are naturally higher, covering as they must increased freight and the necessity of larger stocks with increased interest and warehouse charges on account of the distances from sources of supply, infrequent turnover of stock and uncertainty as to delivery of goods in transit. Moreover, the Far West presents a wide variation in demand due to a small population spread over a wide area in agricultural and mining communities, as contrasted with the denser population of the East and Middle West, their nearness to the sources of supply, the more frequent turnover in stocks and the constant demands which arise in industrial centers. Price variations may be due to difference in grade of products of different manufacturers, to local conditions, or to both.

ARMORED CONDUCTOR, FLEXIBLE STEEL

Single-Conductor

B. & S. Size	List Per 1000 Ft.
No. 14 solid	$61.00
No. 12 solid	71.00
No. 10 solid	90.00
No. 8 solid	106.00
No. 6 solid	145.00
No. 10 stranded	95.00
No. 8 stranded	115.00
No. 6 stranded	160.00
No. 4 stranded	205.00
No. 2 stranded	266.00
No. 1 stranded	315.00

Twin-Conductor

No. 14 solid	104.00
No. 12 solid	135.00
No. 10 solid	185.00
No. 8 stranded	235.00
No. 6 stranded	370.00
No. 4 stranded	575.00

NET PRICE AND DISCOUNT PER 1000 FT.—NEW YORK

Single-Conductor

	No. 14 Solid
Less than coil	List to + 15%
Coil to 1000 ft	10%
	No. 12 Solid
Less than coil	List to + 10%
Coil to 1000 ft	10%

Twin-Conductor

	No. 14 Solid
Less than coil	List to $120.00
Coil to 1000 ft	10% to $100.00
	No. 12 Solid
Less than coil	List to + 15%
Coil to 1000 ft	10%

DISCOUNT—CHICAGO

Single-Conductor

	No. 14 Solid
Less than coil	15% to + 10%
Coil to 1000 ft	15% to + 10%
	No. 12 Solid
Less than coil	15% to + 10%
Coil to 1000 ft	10% to 20%

Twin-Conductor

	No. 14 Solid
Less than coil	15% to + 10%
Coil to 1000 ft	10%
	No. 12 Solid
Less than coil	15% to + 10%
Coil to 1000 ft	10% to 20%

ATTACHMENT PLUGS

List ranges from $0.22 to $0.30 each.
Standard packages from 100 to 250.

DISCOUNT—NEW YORK

Less than 1/5 std. pkg	+ 10% to 24.00c.
1/5 to std. pkg	8% to 19.80c.
Std. pkg.	25% to 18.75c.

DISCOUNT—CHICAGO

Less than 1/5 std. pkg	10% to 20%
1/5 to std. pkg	List to 20%
Std. pkg.	28% to 44%

BATTERIES, DRY

NEW YORK

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 50	.35	.35
50 to barrel	.31	.32
Barrel lots	.285	.295

BATTERIES, DRY—Continued

CHICAGO

Each Net	No. 6 Regular	No. 6 Ignitor
Less than 12	$0.40	$0.40
12 to 50	.35	.35
50 to barrel	.3175-.32	.3275-.33
Barrel lots	.2875-.29	.2975-.30

CONDUIT, METALLIC FLEXIBLE

Size, In.	Ft. per Coil	List, per 100 Ft.
5/16	250	$5.00
3/8	250	7.50
1/2	100	10.00
3/4	50	13.00
1	50	21.00
1 1/4	50	26.00
1 1/2	25-50	35.00
2	25-50	45.00
2 1/2	25-50	52.00

NET PER 100 FT.—NEW YORK

	Less Than Coil	Coil to 1000 Ft.
3/8-in. s. stp.	List to $82.50	15% to $67.50
3/8-in d. stp.	+10% to 84.00	List to 69.00
1/2-in. s. stp.	List to 110.00	15% to 90.00
1/2-in. d. stp.	+10% to 112.00	List to 92.00

NET PER 1000 FT.—CHICAGO

	Less Than Coil	Coil to 1000 Ft.
1/2-in. single strip	List	$63.75
3/8-in. double strip	78.25-78.75	71.25-71.75
3/8-in. single strip	List	85.00
1/2-in. double strip	105.00	95.00

CONDUIT, NON-METALLIC FLEXIBLE

Size, In.	List per Foot	Size, In	List per Foot
7/32	$0.05 1/2	1	$0.25
1/4	.06	1 1/4	.33
3/8	.09	1 1/2	.40
1/2	.12	1 3/4	.47
5/8	.15	2	.55
3/4	.18	2 1/4	.65

NET PER 1000 FT.—NEW YORK

	Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.—			
	$25.00-$49.50	$20.50-$41.25	$20.50-$30.00
1/4-in.—			
	$28.00-$54.00	$22.50-$45.00	$22.00-$36.00

NET PER 1000 FT.—CHICAGO

	Less Than $15 List	$15 to $60 List	$60 to $150 List
7/32-in.—			
	$36.00-$55.00	$25.00	$22.50
1/4-in.—			
	$40.00-$60.00	27.00	25.00

CONDUIT, COUPLINGS AND ELBOWS, RIGID IRON

Card No. 39

Size, In.	Conduit List per Foot
1/4	$0.08 1/4
3/8	.08 1/2
1/2	.08 1/2
3/4	.11 1/2
1	.17
1 1/4	.23
1 1/2	.27 1/4
2	.37 1/4
2 1/2	.58 1/4
3	.76 1/2

CONDUIT, COUPLINGS AND ELBOWS, RIGID IRON—Continued

Size, In.	Couplings, List	Elbows, List
1/4	$0.05	$0.19
3/8	.06	.19
1/2	.07	.19
3/4	.10	.25
1	.13	.37
1 1/4	.17	.45
1 1/2	.21	.50
2	.28	1.10
2 1/2	.40	1.80
3	.60	4.80

DISCOUNT—NEW YORK

	1/4 in. to 1/2 in.	3/4 in. to 3 in.
Less than 2500 lb.	4% to 6.7%	7% to 20%
2500 to 5000 lb.	6%	9% to 25%

(For galvanized deduct six points from above discounts.)

DISCOUNT—CHICAGO

	1/4 in. to 1/2 in.	3/4 to 3 in.
Less than 2500 lb.	6.8% to 8.8%	9.8% to 11.9%
2500-5000 lb.	8.8% to 10.9%	12.3% to 13.9%

(For galvanized deduct six points from above discounts.)

FLATIRONS

NEW YORK

List price	$5.00 to $6.00
Discount	25% to 30%

CHICAGO

List price	$5.00 to $6.00
Discount	25% to 30%

FUSES, INCLOSED

	Std. Pkg.	List
250-Volt		
3-amp. to 30-amp.	100	$0.25
35-amp. to 60-amp.	100	.35
65-amp. to 100-amp.	50	.90
110-amp. to 200-amp.	25	2.00
225-amp. to 400-amp.	25	3.60
450-amp. to 600-amp.	10	5.50
600-Volt		
3-amp. to 30-amp.	100	$0.40
35-amp. to 60-amp.	100	.60
65-amp. to 100-amp.	50	1.50
110-amp. to 200-amp.	25	2.50
225-amp. to 400-amp.	25	5.50
450-amp. to 600-amp.	10	8.00

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.	10% to 30%
1/5 to std. pkg.	20% to 41%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.	28% to 30%
1/5 to std. pkg.	38% to 41%

FUSE PLUGS

3-Amp. to 30-Amp.

NEW YORK

	Per 100 Net
Less than 1/5 std. pkg.	List to $5.50
1/5 to std. pkg.	15% to $4.75

Standard packages, 500. List, each $0.07

CHICAGO

	Per to 100 Net
Less than 1/5 to std. pkg.	$7.00
1/5 to std. pkg.	5.75

Standard packages, 500. List, each $0.07

LAMPS, MAZDA

105 to 125 Volts

	Std. Pkg.	List, Each
Regular, clear:		
10 to 40-watt—B	100	$0.30
60-watt—B	100	.35
100-watt—B	24	.70
75-watt—C	50	.70
100-watt—C	24	1.10
200-watt—C	24	2.20
300-watt—C	24	3.25
Round bulbs, 3½-in., frosted:		
15-watt—G 25	50	.53
25-watt—G 25	50	.55
40-watt—G 25	50	.55
Round bulbs, 3¾-in., frosted:		
60-watt—G 30	24	.77
Round bulbs, 4⅝-in., frosted:		
100-watt—G 35	24	1.10

DISCOUNT—NEW YORK

Less than std. pkg.....List
Std. pkg. 10%

DISCOUNT—CHICAGO

Less than std. pkg.....List
Std. pkg. 10%

LAMP CORD

Cotton Covered, Type C, No. 18

NEW YORK

	Per 1000 Ft. Net
Less than coil (250 ft.)	$31.00 to $33.80
Coil to 1000 ft	27.90 to 28.73

CHICAGO

	Per 1000 Ft. Net
Less than coil (250 ft)	$29.00 to $30.00
Coil to 1000 ft	21.50 to 22.30

LAMP GUARDS, WIRE

Standard packages from 50 to 150

NEW YORK

Net per 100.....$20.00

CHICAGO

Net per 100.....$21.75 to $30.00

OUTLET BOXES

Nos.	List per 100
101—A. A1½, 4 S C., 6200, 320	$30.00
102—B A., 6200, S.E., 300, A.X., 1½ 4 S	30.00
103—C.A., 9, 4R. B 1½	25.00
106—F.A., 7, C.S., 1½, 3 R	20.00

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $10.00 list	30%	20%
$10.00 to $50.00 list	35%	25%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $10.00 list	40%	35%
$10.00 to $50.00 list	50%	45%

PIPE FITTINGS

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.....5% to 10%
1/5 to std. pkg.....15% to 20%
Std. pkg. .....25% to 30%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.....10%
1/5 to std. pkg.....20%
Std. pkg 30%

PORCELAIN CLEATS—UNGLAZED

Two and Three Wire

NEW YORK

	Per 1000 Net
Less than 1/5 std. pkg	$15.80 to $20.00
1/5 to std. pkg	14.80 to 20.00

Standard package, 2200. List per 1000, $20.

CHICAGO

	Per 1000 Net
Less than 1/5 std. pkg	$15.80
1/5 to std. pkg	14.80

Standard package, 2200. List per 1000, $20.

PORCELAIN KNOBS

NEW YORK

Per 1000 Net.	Std. Pkg. 3500 5½ N.C.—Solid	Std. Pkg. 4000 Nail-it—N.C.
Less than 1/5 std. pkg	$11.85	$30.70 to $30.75
1/5 to std. pkg	11.10	24.20

CHICAGO

Per 1000 Net.	Std. Pkg. 3500 5½ N.C.—Solid	Std. Pkg. 4000 Nail-it—N.C.
Less than 1/5 std. pkg	$11.85	$30.75
1/5 to std. pkg	11.10 to $11.40	24.20

SOCKETS AND RECEPTACLES

	Std. Pkg.	List
⅛-in. cap key and push sockets	500	$0.33
⅛-in. cap keyless socket	500	.30
⅛-in. cap pull socket	250	.60

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.....+ 10%
1/5 to std. pkg.....5% to 8%

NET PER 100—CHICAGO

Less than 1/5 std. pkg....10% to 29.70 cts.
1/5 std. pkg.....20% to 26.40 cts.

SWITCHES, KNIFE

250-Volt, Front Connections, No Fuse

High Grade:	
30-amp. S. P. S. T.	$0.80
60-amp. S. P. S. T.	1.20
100-amp. S. P. S. T.	2.25
200-amp. S. P. S. T.	3.48
300-amp. S. P. S. T.	5.34
30-amp. D. P. S. T.	1.20
60-amp. D. P. S. T.	1.78
100-amp. D. P. S. T.	3.38
200-amp. D. P. S. T.	5.20
300-amp. D. P. S. T.	8.00
30-amp. 3 P. S. T.	1.80
60-amp. 3 P. S. T.	2.68
100-amp. 3 P. S. T.	5.08
200-amp. 3 P. S. T.	7.80
300-amp. 3 P. S. T.	12.00
Low Grade:	
30-amp. S. P. S. T.	0.42
60-amp. S. P. S. T.	0.74
100-amp. S. P. S. T.	1.50
200-amp. S. P. S. T.	2.70
30-amp. D. P. S. T.	0.68
60-amp. D. P. S. T.	1.22
100-amp. D. P. S. T.	2.50
200-amp. D. P. S. T.	4.50
30-amp. 3 P. S. T.	1.02
60-amp. 3 P. S. T.	1.84
100-amp. 3 P. S. T.	3.76
200-amp. 3 P. S. T.	6.76

DISCOUNT—NEW YORK

	High Grade
Less than $10 list	List to + 10%
$10 to $25 list	15% to list
$25 to $50 list	10%
	Low Grade
Less than $10 list	10% to list
$10 to $25 list	10% to 25%
$15 to $50 list	15%

DISCOUNT—CHICAGO

	High Grade
Less than $10 list	+ 5%
$10 to $25 list	10% to 11%
$25 to $50 list	14%
	Low Grade
Less than $10 list	5%
$10 to $25 list	16%
$25 to $50 list	24%

SWITCHES, SNAP AND FLUSH

5-Amp. and 10-Amp., 125-Volt Snap Switches

	Std. Pkg.	List
5-amp. single pole	250	$0.28
5-amp. single-pole, ind.	250	.32
10-amp. single-pole	100	.48
10-amp. single pole, ind.	100	.54
5-amp. three-point	100	.54
10-amp. three-point	50	.76
10-amp., 250-volt, D. P.	100	.66

10-Amp., 250-Volt Push-Button Switches

	Std. Pkg.	List
10-amp. single-pole	100	$0.45
10-amp. three-way	50	.70
10-amp. double-pole	50	.70

SWITCHES, SNAP AND FLUSH—Cont'd

DISCOUNT—NEW YORK

Less than 1/5 std. pkg.....+ 10%
1/5 to std. pkg.....5% to 8%
Std. pkg. .....23% to 25%

DISCOUNT—CHICAGO

Less than 1/5 std. pkg.....10% to + 20%
1/5 to std. pkg.....List to 20%
Std. pkg. .....List to 28%

SWITCH BOXES, SECTIONAL CONDUIT

Union and Similar—	List, Each
No. 155	$0.34
No. 160	.60

DISCOUNT—NEW YORK

	Black	Galvanized
Less than $2.00 list	List to 20%	List
$2.00 to $10.00 list	10% to 25%	5%
$10.00 to $50.00 list	20% to 30%	15%

DISCOUNT—CHICAGO

	Black	Galvanized
Less than $2.00 list	25%	20%
$2.00 to $10.00 list	25% to 50%	20% to 40%
$10.00 to $50.00 list	25% to 64%	20% to 52%

TOASTERS, UPRIGHT

NEW YORK

List price .....$5.00 to $6.00
Discount .....25% to 30%

CHICAGO

List price .....$5.00 to $6.00
Discount .....25% to 30%

WIRE ANNUNCIATOR

NET PRICE—NEW YORK

	Per Lb. Net
No. 18, less than full spools	$0.44¼-$0.50
No. 18, full spools	0.43¼- 0.45

CHICAGO

	Per Lb. Net
No. 18, less than full spools	$0.57½-$0.65
No. 18, full spools	.50- 0.55

WIRE, RUBBER-COVERED, N. C.

Solid-Conductor, Single-Braid

NEW YORK

	Price per 1000 Ft. Net		
No.	Less than 500 Ft.	500 to 1000 Ft.	1000 to 5000 Ft.
14..	$15.00	$13.00-$14.00	$11.50-$12.25
12..	23.25- 26.25	20.62- 21.30	16.13- 19.35
10..	32.40- 36.47	29.70- 28.65	22.40- 27.00
8..	45.70- 51.24	40.26- 41.90	31.35- 38.00
6..	72.40- 81.06	63.69- 66.35	50.79- 60.30

CHICAGO

	Price per 1000 Ft. Net		
No.	Less than 500 Ft.	500 to 2500 Ft.	2500 to 5000 Ft.
14..	$18.00	$13.00	$11.50
12..	25.33- 26.28	22.02- 26.28	18.55- 20.93
10..	30.49- 36.54	27.94- 31.26	22.86- 29.23
8..	42.54- 51.57	38.99- 44.13	31.90- 41.23
6..	66.46- 88.38	62.43- 71.61	50.53- 70.70

WIRE, WEATHERPROOF

Solid-Conductor, Triple-Braid, Size 4/0 to 3 Inc.

NEW YORK

	Per 100 Lb. Net
Less than 25 lb.	$35.25 to $37.85
25 to 50 lb.	37.85
50 to 100 lb.	34.25 to 37.10

CHICAGO

	Per 100 Lb. Net
Less than 25 lb.	$37.43 to $40.35
25 to 50 lb.	36.43 to 39.35
50 to 100 lb.	35.43 to 38.35

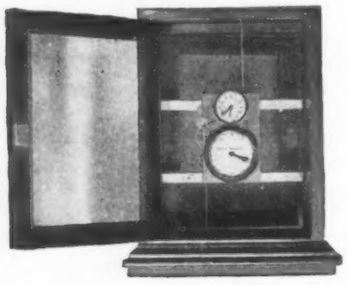
NEW APPARATUS & APPLIANCES

A Record of Latest Developments and Improvements in Manufacturers' Products Used in the Electrical Field

Master Clock for Standardization of Frequencies

Independent generating stations can be tied together and held at a standard frequency by means of a clock that has been designed and placed upon the market by the Warren Clock Company, Ashland, Mass. This clock is placed on the switchboard in each station within view of the operator. It contains two complete movements, one accurately controlled by a pendulum having an in-bar rod and dead-beat escapement, and the other by a Warren self-starting synchronous motor. There are two second hands on the large upper dial of the clock, which is 5 in. (12.7 cm.) in diameter. One of these hands is black and connects with the pendulum so that it registers the correct time. The other second hand is mounted upon the same center and revolves over the same dial. It is gold color and receives its motion from the Warren motor. The motor, which requires only 2 watts power, is connected to some instrument transformer which is always in the circuit. Therefore the gold circuit hand on the master clock indicates or counts the alternation of the current because it moves at a rate depending entirely upon the frequency of the current.

If the average value of the frequency of the current is exactly normal, the gold handle moves at the same speed as the black hand and they will constantly remain together. If the frequency is above normal, the gold hand will gain on the black hand, and it will lose if the frequency is low. The operator is instructed to adjust the speed of the turbine when these two hands do not agree. It is claimed that this device has an advantage over the ordinary



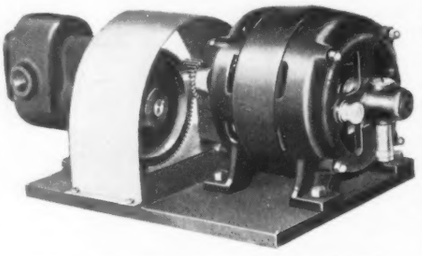
TOP PART OF MASTER CLOCK, SHOWING THE TWO SECOND-HANDS

frequency meter because it is not actuated by the temporary fluctuations of frequencies that usually occur in generating stations. The frequency will not be manually changed until it is absolutely necessary. This eliminates, the makers say, the corrections necessary when the ordinary frequency meter is in use. It has been found in practice on large systems that when the frequencies are controlled by one of these clocks its average value, as measured over a twenty-four-hour period, can be held within one-five-hundredth of 1 per cent of its true values.

This device is especially desirable in the interconnection of power stations now being carried out in order to attain increased economy. It is said to greatly simplify the problem of parallel operation for power stations running at the same frequency.

Motor-Driven Pump for Handling Oil

For pumping oil from a barrel to an overhead reservoir and for oiling systems William W. Nugent & Company, Chicago, have developed and placed upon the market a motor-driven rotary oil pump. It may be used to store oil for use in a gravity oil system. The

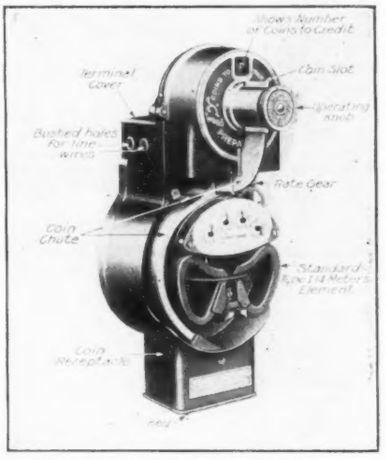


PUMP GEARED DIRECTLY TO ELECTRIC MOTOR BY NOISELESS GEAR

pump is driven by a General Electric 1/6-hp. motor by means of gear and a noiseless rawhide pinion. The machine can be fitted with the type of motor required for the prevailing energy supply. The motor is controlled by means of a rheostat and switch box mounted in a convenient location.

Prepayment Watt-Hour Meter

Elimination of uncollectible accounts and reduction in the cost of collecting from the small consumer are achieved by means of a prepayment watt-hour meter that has been developed and placed upon the market by the General Electric Company of Schenectady, N. Y. This meter is called the type I P-5 for use on alternating-current circuits and consists of a mechanically operated prepayment device which is an integral part of the regular I-14 G-E watt-hour meter. As shown in the accompanying illustration, the prepayment mechanism is actuated by a large coiled spring, wound when depositing the coin. The only load imposed upon the driving element of the meter is that of actuating the tripping device, but this requires practically no energy and therefore



METER AUTOMATICALLY CUTS OUT OF SERVICE WHEN ENERGY PAID FOR IS USED

does not interfere with the accuracy of the meter. The insertion of the first coin and turning of the knob automatically closes the controlling switch. When energy to the value of the deposit has been recorded the switch is automatically opened until another coin has been deposited.

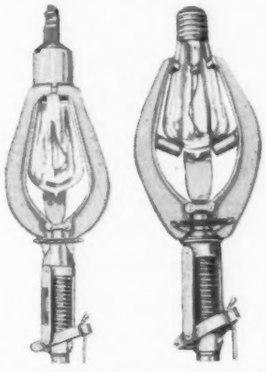
An additional feature claimed by the manufacturers is the fact that the apparatus can be left in service when consumers move in and out of houses. This eliminates the trouble and expense of cutting service, because the equipment is undisturbed.

Light-Weight, Easily Operated Lamp Renewer

Pole climbing or the handling of heavy ladders to make renewals is eliminated by a lamp renewer that has recently been placed upon the market by the G. C. A. Manufacturing Company of 92 Renne Avenue, Pittsfield, Mass. The device consists of a three-jawed clutch mounted upon the end of a pole. The pole is conveniently jointed in sections by means of metal ferrules and quick-change snaps which permit instant adaptation to the length desired. The clutch for the series lamps, which is made to grip the bead on the porcelain of the lamp socket, is opened by pulling a cord and closed by releasing the cord. The series of lamps are re-

moved and replaced by pulling or pushing on the bead of the socket.

The lamp renewer for multiple lamps or others that unscrew from fixed sockets is fitted with rubber-tipped projecting fingers which automatically center the glass lamp bulb in the clutch jaws, holding the bulb in the same manner as when unscrewed by hand.



LAMP RENEWERS FOR BOTH SERIES AND MULTIPLE UNITS

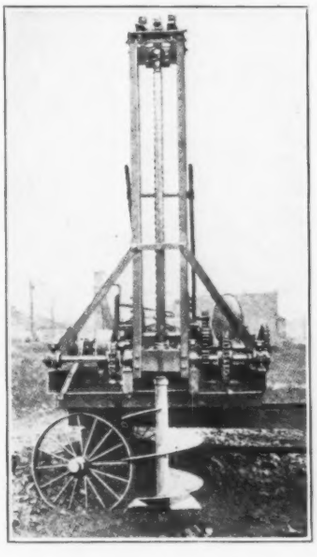
These devices are made in four models —one for series street lamps 100 cp. and smaller, one for series street lamps 250 cp. and smaller, one for series street lamps 1000 cp. and smaller, and one for multiple lamps which accommodates all sizes. Each model includes 7 ft. (2.1 m.) of pole, besides the clutch mechanism. Additional 42-in. (104-cm.) interlocking pole sections may be obtained if desired.

Power-Driven Machine for Boring Pole Holes

Pole holes for transmission and distribution lines can be quickly and efficiently bored by means of a machine that has been placed upon the market by the International Earth-Boring Machine Company, P. O. Box 408, Chicago. The machine shown in the accompanying illustration is mounted upon a steel roller-bearing hub truck and consists of a turntable 5 ft. by 12 ft. (1.5 m. by 3.7 m.) upon which is arranged the mechanism for transmitting the power from the driving engine to the boring auger. The turning power and pressure is applied by means of gears on the tower. The equipment is so balanced upon the turntable that it may be swung around to any point of boring and also may be adjusted for boring on hills or inclines at an angle of from 15 deg. to 20 deg. The motive power for the device shown in the illustration consists of a 40-hp. motor. Its connection with the gearing of the boring equipment is by means of a heavy socket chain. Two levers are provided for operating the auger, one controlling the speed and the other raising and lowering the auger. When boring in the ground the speed is about 10 ft. (3 m.) per minute, and when raising the pole from the hole, 25 ft. to 50 ft. (7.6 m. to 15.2 m).

Two men can operate this machine, and it is claimed that the efficiency is, on the average, 100 poles in a ten-hour day. This includes digging the hole, setting the pole and moving from one point to another. Provision is also made for equipping the earth-boring machine with a derrick for raising poles from the ground and lowering them into the holes. Augers of various sizes from 3 in. to 30 in. (7.6 cm. to 76 cm.) may be used with satisfactory results. The holes bored by this equipment are uniform and clean-cut, and the soil removed from the holes is well broken up for tamping purposes. In addition to the use of the machine for pole-line construction work, it may be advantageously utilized in digging trenches for underground conduit. For this purpose a series of holes, close together, may be bored and then the intervening walls removed, thus forming the trench.

A third model is being designed by the company that will be adaptable and attachable to any power truck with a



HOLES CAN BE QUICKLY AND EFFICIENTLY BORED WITH THIS MACHINE

shaft drive. It will then be able to be detached when earth-boring apparatus is not being used and the truck used for other purposes. This machine can well be used in city work such as putting pole holes in alleys and narrow streets.

Concrete Mixer for Manhole and Conduit Work

For mixing concrete for work on manholes and conduits the Oshkosh (Wis.) Manufacturing Company has placed upon the market a mixer that is said to be efficient and economical on construction of this kind. This type of work becomes very expensive when done by hand, and its heavy nature makes it hard to get men to do it. The mixer, as the manufacturers claim, is particularly fitted for manhole and conduit work and is highly portable, weighing only 1600 lb. (726 kg.). It is also said that it will withstand the hard wear that it would be sure to get in this kind of service.

This mixer, known as the "Eveready," has a batch capacity of 4 cu. ft. (0.11 cu. m.) and turns out a perfect mix in forty-five seconds, which gives it a rating of 35 cu. yd. to 50 cu. yd. (26.7 cu. m. to 38.2 cu. m.) per day. The machine is of the worm-type drive, the worm gear running in oil and being completely housed, together with the bearings and shaft. The mixing drum is of the tub type and has the "four motion" mix. Material is shoveled in at an opening of ample size, and the drum is automatically discharged by opening a shutter and allowing the mixed batch to run out either into a wheelbarrow for conveyance or direct into the forms.

The whole drum can be discharged in twelve seconds, or only a portion of it may be discharged at a time, a feature which is very desirable in a mixer of this kind. The "Eveready" is driven by a 2-hp. two-cycle horizontal water-cooled gasoline engine directly connected.

Lighting Fixture That Fits Any Standard Socket

Objectionable glare is eliminated in a lighting fixture called the "Amco-Illuminet," according to the manufacturer, the Art Metal Manufacturing Company, Cleveland, Ohio. The fixture is a combination of metal and glass, the metal part being spun over the glass, forming one piece. The neck of the metal part of the fixture is so made that when it is pushed up over the head of the standard socket it snaps into place and forms one continuous line with the socket, as shown in the accompanying illustration. The glass is made with the bottom open, the bottom being made of various sizes to fit the large part of the standard 75, 100 and 150-watt type C lamps. The lamps used in the fixture have their bottom portion frosted, the bottom of the lamp

COMBINATION METAL AND GLASS FIXTURE

thus forming the lower part of the fixture. A flat, polished metal reflector is placed on the inside of the upper portion of the fixture and acts as a projector and diffuser to intensify the light downward and outward over a wide area.

Trade Notes

R. A. COYELL, who for some time has been connected with the New Haven office of the Cutler-Hammer Manufacturing Company of Milwaukee, Wis., has become office manager of the New York branch of the company.

THE GENERAL ELECTRICAL COMPANY of Chicago has lately opened a large branch with offices and a traveling force in Memphis, Tenn., in the Lotus Building, Jefferson Avenue, near Second Street, where the entire first floor is occupied.

ALBERT S. LINDSTROM has resigned as general manager of the Thordarson Electric Manufacturing Company of Chicago and has accepted a position at Washington, D. C., as representative for the Moloney Electric Company of St. Louis, Mo.

C. B. HUGHES, who was formerly sales manager of the Minerallac Electric Company of Chicago, has been made manager to succeed James Van Buskirk, who resigned to assume the management of the Chicago office of the Moloney Electric Company of St. Louis.

CHARLES A. McCUNE has resigned his position as chief engineer of the Commercial Acetylene Company to become sales engineer with the Page Steel & Wire Company, 30 Church Street, New York, where his efforts will be devoted to service in connection with Armco welding rods.

THE DOEHLER DIE CASTING COMPANY of Toledo, Ohio, which is housed in a model factory building completed a little more than a year ago, has in this short space outgrown its quarters. In order to provide for this expansion the company has found it necessary to take over the adjoining plant of the Ohio Electric Company, doubling the present capacity.

THE APPLIANCE MANUFACTURING & DISTRIBUTING COMPANY has leased the building formerly occupied by the Rutenber Electric Company and will establish a plant for manufacturing heating appliances and other specialties at Logansport, Ind. The company was formerly established in Chicago. It will also hold the State agency for the Brascolite lighting fixtures.

J. L. FUGATE of Salt Lake City, Utah, has associated himself with the William A. Mullins Electric Company of Tacoma, Wash., occupying the position of sales and factory manager. Mr. Fugate was manager of the factory and fixture department of the Capitol Electric Company of Utah. This concern has twenty-one stores in Idaho, Utah and Montana, which were under his supervision.

R. L. LUNT, electrical engineer of Minneapolis, Minn., has become connected with the sales department of the Packard Electric Company, in charge of the Minneapolis branch, 716-18 McKnight Building. For years Mr. Lunt was connected as sales engineer with the Western Electric Company's Philadelphia office. From there he went with the Electric Storage Battery Company of Philadelphia.

THE PARR TERMINAL COMPANY, Wilfred N. Ball engineer, 225 First National Bank, Oakland, Cal., wants catalogs and other data from manufacturers of electrical materials or equipments used in the construction of piers, warehouses, industrial buildings, belt line railway and street work and cargo-handling equipment, coal bunkering and handling equipment, floating drydock and marine railway equipment, and general shipyard machinery and equipment.

WIRELESS CASE POSTPONED.—The case of the Marconi Wireless Telegraph Company of America vs. the Kilbourne & Clark Manufacturing Company of Seattle, Wash., has been postponed for the duration of the war at the request of the United States Navy Department, formally made in letters addressed to both parties to the controversy. As the case stands now apparatus is being manufactured by Kilbourne & Clark under the protection of a decision of the United States District Court, which held that the company is not infringing. The case had been brought before the United States Circuit Court on the appeal of the Marconi Company.

THE FEDERAL TRADE COMMISSION of Washington, D. C., has ordered the establishment of three branch offices of the commission in New York City, Chicago and San Francisco. The following members of the staff of the commission are to be in charge of the newly established offices: A. P. Thom, Jr., Custom House, New York; Walter B. Wooden, 14 East Jackson Boulevard, Chicago; D. N. Dougherty, Appraiser's Stores Building, San Francisco. The work of the commission has grown enormously as it touches war problems in the finding of costs of production and in the determination of stocks of war and contributing materials on hand and the production capacity for such materials. A great deal centers in New York and Chicago and a constantly increasing amount of work is coming to the commission from the Pacific Coast.

Trade Publications

FARM LIGHTING PLANTS.—The Winters Farm Light Company, Davenport, Iowa, has issued a booklet describing and illustrating its farm lighting plants.

ADDING MACHINES—The Teetor Adding Machine Company, Des Moines, Iowa, has issued a circular describing and illustrating its electrically driven adding and subtracting machine.

FARM LIGHTING SYSTEM.—The Marron Manufacturing Company, Rock Island, Ill., is distributing a circular describing the Marron farm lighting system and telling why this type of unit should be used.

SWITCHES.—"Snap Switches That Are Different" is the title of folder No. 251, which is being distributed by the Cutler-Hammer Manufacturing Company of Milwaukee, Wis. This folder illustrates and describes the features of the C-H snap switches.

LABOR-SAVING DEVICES.—The Hurley Machine Company of Chicago has just issued its 1918 catalog of Thor electric labor-saving devices for the home. The catalog illustrates washing machines, ironing machines and vacuum cleaners. It contains forty-eight pages.

RESISTANT UNITS. — An automobile storage-battery charging unit for use in connection with the Delco-Light 32-volt plant is described and illustrated in a circular that is being distributed by the Ward Leonard Electric Company of Mount Vernon, N. Y. The connections of the lighting outfit are shown.

POLYPHASE MOTORS. — Polyphase motors are illustrated and described in a bulletin, No. 25, that has been issued by the Century Electric Company of St. Louis, Mo. Motors of ½ hp. to 60 hp. of the automatic-start induction type are discussed. Several applications of this type of motor are illustrated.

AUTOMOBILE SUPPLIES.—Automobile supplies and garage equipment are described in catalog 122, issued by the Julius Andrae & Sons Company, Milwaukee, Wis. This book contains 515 pages and contains practically everything in accessories for the automobile. Net price list and discounts applying to this catalog are distributed with it.

ELECTRICAL DIRECTORY OF MILWAUKEE.—The Milwaukee Jovian League has compiled and published an electrical directory containing the names of the local members of this organization with their company connection and a complete directory of all electrical manufacturers dealers, contractors, engineering firms and other concerns handling or making electrical goods and machinery.

BOILER-FEED PUMPS. — Centrifugal boiler-feed pumps are described in a pamphlet issued by the De Laval Steel Turbine Company of Trenton, N. J. The pumps are shown with casing removed, showing the turbine rotors and pump impellers. Cross-sectional views are also produced. Actual installations of De Laval motor-driven boiler-feed pumps in large central power stations are also illustrated.

LAMP SHADES.—Bowls and shades with "Rozelle" color decorations applied to Veluria and Ivre glass are illustrated in actual colors in catalog No. 260, issued by the Ivanhoe-Regent Works of the General Electric Company, Cleveland, Ohio. Decorative lighting for the home is discussed, and explanations of the different names of colored decorations are given. This company is also distributing a price list for catalog No. 257.

WIRE.—"Aristos Copper-Weld, Copper-Clad Wire" is the title of a 104-page book that has just been issued by the Page Steel & Wire Company, 30 Church Street, New York. This book contains notes on the manufacture of wire in general and on physical and electrical properties of composites (copper-weld wire); gives tests, specifications and suggestions for determining size of wire for high-tension, telephone, telegraph, signal, police and fire alarm lines; contains helpful information for calculating line drops, meters and short transmission lines, sag and tension in spans, etc. Individual chapters also deal with different sizes of plain copper-weld wire, copper-weld weatherproof wire, tie wires, rods and other copper-weld products. A copy of this bulletin will be mailed on application to the company.

LIGHTING UNITS.—"Scientific Industrial Illumination" is the title of booklet No. 163 that is being distributed by the Holophane Glass Company, 340 Madison Avenue, New York City. This very complete booklet deals with the need of scientific illumination and gives photographs showing how Holophane scientific illumination decreases spoilage in machine shops and other plants. It also discusses fatal accidents due to insufficient illumination. Reflectors are discussed, and distribution curves of the various types are illustrated. Outdoor and indoor illumination of large areas and protective yard lighting are explained in full, with illustrations showing the typical curve for the refractors. Illumination data on such points as the intensity of illumination required in different working spaces are given, as are lamp data and metric and legal equivalents.

New Incorporations

THE CHATTANOOGA (TENN.) PLUMBING & ELECTRICAL COMPANY has been incorporated with a capital stock of $24,000 by V. B. Whiteside, W. C. Teas, P. W. Curtis and others.

THE WINTER STORAGE BATTERY COMPANY of Middletown, N. Y., has been incorporated with a capital stock of $54,000 by M. E. Slawson, E. E. Kidney and E. A. Wheeler of Middletown.

THE BEARMAN-HUGENOT ELECTRIC COMPANY of Mobile, Ala., has been incorporated by R. Baerman, H. Baerman and E. T. Hugenot. The company is capitalized at $15,000 and proposes to do an electrical contracting business.

THE CITIZENS' CONSOLIDATED POWER & ELECTRIC COMPANY of Poteau, Okla., has been incorporated by Wiley W. Lowrey, H. J. Fowler and E. S. Hutton. The company proposes to construct and operate an electric plant in Poteau.

THE BOLTON-WECHTEL COMPANY of Brooklyn, N. Y., has been chartered with a capital stock of $20,000 to deal in batteries and auto accessories. The incorporators are: H. J. Wechtel and W. C. Bolton, 261 Stuyvesant Avenue, Brooklyn.

THE EDISON PRIMARIES BATTERIES COMPANY of West Orange, N. J., has been incorporated with a capital stock of $500,000 by Thomas A. Edison, Charles Edison and Stephen B. Mainbert. The company is a subsidiary of the Thomas A. Edison Company.

THE NATIONAL FIRE & BURGLARY PREVENTION COMPANY of Dover, Del., has been chartered with a capital stock of $150,000 to manufacture fire and burglar alarm systems, etc. The incorporators are: M. M. Clancy and F. A. Armstrong of Wilmington, Del.

THE HOME ELECTRIC EQUIPMENT COMPANY of Clarksburg, Va., has been organized to deal in electrical products. The officers are A. Hattenbach, president; W. S. Waters, vice-president, both of Pittsburgh, Pa., and H. T. Gates, secretary and manager.

BOYLE & ESSENWANGER, INC., of Buffalo, N. Y., has been incorporated with a capital stock of $10,000 by Harry J. Boyle, Louise M. Boyle and George P. Essenwanger of Buffalo. The company proposes to manufacture all kinds of electric storage batteries.

THE MARS MANUFACTURING COMPANY of New York, N. Y., has been incorporated by Max Ebetz, Solomon Luber and Edna I. Lines of New York City. The company is capitalized at $10,000 and proposes to manufacture all kinds of electric and electro-technical novelties.

THE MARSHALL ELECTRIC COMPANY of Marshalltown, Iowa, has been chartered with a capital stock of $50,000 to deal in electrical supplies of all kinds. The officers are: E. N. Peak, president; A. J. Clark, vice-president; R. W. Van Horn, treasurer, all of Marshalltown.

THE WATERLOO STORAGE BATTERY COMPANY has been incorporated with a capital stock of $25,000 to deal in electric storage batteries, automobile accessories, supplies, etc. The officers are: E. G. Mann, president and general manager; Clifford DePuy, treasurer, and Earl S. Linn, secretary.

New England States

HILL, N. H.—The local electric-light plant, owned by Frank R. Woodward, was wrecked by a flood caused by the breaking away of a dam. The plants of the New England Novelty Company and the George H. Adam Needle Company were also badly damaged. The total loss is estimated at about $50,000. The town is at present without electrical service.

AMHERST, MASS.—Plans are being prepared for the construction of a new turbine house at Massachusetts Agricultural College in connection with the installation of a new coal-handling plant. The cost of the proposed work is estimated at about $55,200. James H. Ritchie, 8 Beacon Street, Boston, is architect.

BOSTON, MASS.—James J. Storrow, New England Fuel Administrator, has appealed to the National Fuel Administration for authority to restrict the use of electricity for signs and other forms of display lighting in order to reduce the consumption of coal.

BOSTON, MASS.—The Eastern Massachusetts Electric Company has filed a petition with the Board of Gas and Electric Light Commissioners asking permission to issue $300,000 in bonds and $83,200 in capital stock. The company states that it requires additional funds to meet the indebtedness incurred in the construction of transmission lines and extensions to its property in Salem and Malden.

LEOMINSTER, MASS.—The Leominster Electric Light & Power Company has applied to the Council for permission to erect and maintain high-tension transmission lines through Nashua, Hamilton and Nile Streets for the purpose of supplying electricity to the new factories of the Standard Comb Company.

PEABODY, MASS.—Plans have been prepared by A. E. Bump, 60 North Market Street, Boston, architect, for a one-story addition to the power plant of the A. C. Lawrence Leather Company, Crownshield Street.

QUINCY, MASS.—Lieut. George Summersby, U. S. N., has petitioned the Board of Gas and Electric Light Commissioners to authorize the Murray & Tregurtha Company of Quincy to obtain electricity from the Edison Electric Illuminating Company of Boston to operate two aircraft plants. The law stipulates that whenever possible power must be purchased from the local company.

SPRINGFIELD, MASS.—The Little River power bill, which permits the city of Springfield to generate power from its Little River water system has been signed by the Governor. The Water Department will begin immediately preparing plans for power development to utilize water now going to waste for power development.

WORCESTER, MASS.—The Worcester Electric Light Company has purchased land (about 15,000 square feet) adjoining its present property. The site, it is understood, will be used as an extension of the Webster Street plant.

WORCESTER, MASS.—The New England Power Company has petitioned the Board of Gas and Electric Light Commissioners for permission to issue $350,000 in capital stock and $600,000 in bonds, the proceeds to be used to meet obligations incurred in the erection of power and transmission lines and improvements to its plants at Webster and Milford.

Middle Atlantic States

BROOKLYN, N. Y.—Contract has been awarded by Rubel Brothers, Inc., Glenmore Avenue, to the George Weiderman Electric Company, 191 Flatbush Avenue, for all electrical work in connection with the construction of a large ice manufacturing plant at Blake and Van Sinderen Avenues.

BROOKLYN, N. Y.—The contract for the electrical work and equipment in connection with the reconstruction of the large public bath house at Sea Breeze Avenue, near Ocean Park, has been awarded to Louis Kalisher, 1225 Myrtle Avenue. The cost of the building is estimated at about $275,000.

BROOKLYN, N. Y.—The Robert Gair Company, 50 Washington Street, has awarded contract for the construction of a four-story extension to its boiler plant, at Plymouth and Washington Streets, to the Turner Construction Company, 244 Madison Avenue, New York City. The cost of the proposed improvement is estimated at about $20,000.

DUNKIRK, N. Y.—The Common Council has accepted the report of the special committee recommending the installation of a single-lamp standard system for the new ornamental lighting system on the business streets. Bids will soon be asked by the street committee of the Council for the equipment and installation of the proposed system.

FAIRPORT, N. Y.—Arrangements are ing made by the Rochester Railway & Light Company to extend its electric transmission line to Fairport to supply electricity to the Sanitary Car Company.

HUDSON, N. Y.—Plans are being considered by Benjamin Wenzel, who conducts the Lake Charlotte House, to establish an electric-light plant to supply electricity for lighting the hotel, cottages and farmhouses in that vicinity. It is proposed to utilize the fall of water from the lake to generate the power.

NEW YORK, N. Y.—The Detroit Cadillac Motor Car Company, 1881 Broadway, is planning to install a service and repair works in connection with its new 12-story building to be erected at Columbus Avenue and Sixty-second Street, New York, at a cost of about $600,000. Frederick T. Ley & Company, 19 West Forty-fourth Street, have the contract for construction of building.

SYRACUSE, N. Y.—Plans are under consideration by the City Council for the construction of a new electrically-operated pumping plant at the municipal sewage disposal works, to cost about $8,000.

UTICA, N. Y.—Improvements are under way at the local plant of the Adirondack Electric Power Corporation and will soon be completed. The work will include the installation of a new boiler, generators and transformers.

CAMDEN, N. J.—Bids are being asked by the New York Shipbuilding Company of Camden for the erection of a one-story plate and angle shop, 200 ft. by 594 ft. Plans are also being prepared for a new steel fabricating plant and for a one-story forge shop 45 ft. by 55 ft. The company has awarded contract to Doyle & Company, 1519 Sansom Street, Philadelphia, Pa., for the construction of an office building at the works, to cost about $75,000.

JERSEY CITY, N. J.—The Terminal Transit Company, it is reported, is planning to construct a shipbuilding plant at Doyer's Point, Newark Bay, Jersey City.

KEARNEY, N. J.—Contract has been awarded by the Ford Motor Car Company, Highland Park, Detroit, Mich., for electrical work in connection with the new factory building, located at the site of its proposed new shipbuilding plant on Newark Bay, to the K. W. Electric Company, 49 Lawrence Street.

NEWARK, N. J.—Plans have been prepared by the Public Service Company for the erection of a new building, 50 ft. by 162 ft., at Bloomfield Avenue and Lake Street.

NEWARK, N. J.—Alfred Sommer, 466 Summer Avenue, submitted the lowest bid ($9,379) to the Board of Education for electrical work in connection with the proposed improvements to the Hawkins Street school building.

NEWARK, N. J.—The plant of the Gleeson Wire Company, John Street, East Newark, was damaged by fire recently, causing a loss of about $65,000. It is understood that the works will be rebuilt at once. The company manufactures electric wires, etc.

PLAINFIELD, N. J.—Four additions are being erected to the plant of the Niles-Bement-Company on South Second Street. Two of the large buildings will be 100 ft. by 180 ft., one story high. A large boiler plant is also being built in connection with the improvements. The cost of the work is estimated at about $400,000.

EASTON, PA.—Preparations are being made for the installation of a 10,000-kw. turbine at the Dock Street station of the Pennsylvania Utilities Company. A condenser will also be installed at the same time. It is expected to have the new equipment in operation by August 1.

ERIE, PA.—Work is progressing rapidly on the installation of the ornamental street-lighting system along State Street and in Perry Square.

GLENWOOD, PA.—Contract has been awarded by the Baltimore & Ohio Railroad Company to the Westinghouse-Church-Kerr Company, 37 Wall Street, New York, N. Y., for the erection of locomotive repair shops at Glenwood, to cost about $1,700,000.

HARRISBURG, PA.—Plans are under consideration by the Harrisburg Light & Power Company for placing its overhead wires in underground conduits.

HARRISBURG, PA.—The City Council is considering plans for extensions to the police and fire-alarm systems, for which plans have been prepared. Clark E. Diehl is city electrician.

PHILADELPHIA, PA.—Improvements are being considered for the power plant of the Miller Chemical Company at Delaware Avenue and Mifflin Street.

PHILADELPHIA, PA.—The new foundry addition to be erected by the Aetna Foundry Company, Twenty-second Street and Allegheny Avenue, will be equipped with a 10-ton electric traveling crane.

SHARON, PA.—Plans are under consideration by the Savage Arms Company, 50 Church Street, New York, N. Y., for the construction of an addition, 40 ft. by 60 ft., to the power plant at its local works. Griggs & Myers, 110 West Fortieth Street, New York City, are engineers.

WAYNESBORO, PA.—The Chambersburg, Greencastle & Waynesboro Street Railway Company has begun work on the erection of a large steel tower to be located near its new building in East Main Street. The tower will receive high-tension current from the power house at Security, Md.

TIMONIUM, MD.—Plans are being considered by the Maryland State Fair and Agricultural Society for the installation of electric lamps on the grounds, erection of dancing pavilion and several new exhibition buildings. Louis McLane Merryman of Cockeysville is president.

HUNTINGTON, W. VA.—The Consolidated Light, Heat & Power Company, it is said, will petition the United State government for assistance in enlarging its plant to provide for the extraordinary demands upon it by war industries in this district, including Huntington and Ashland. Four new boilers are needed for the plant, which cannot be purchased as the government has commandeered all of that product. The assistance will be in nature of a loan. The government will furnish the needed equipment, to be used exclusively for war work. W. R. Power is general manager.

KINGWOOD, W. VA.—The Hoffman Coal Mining Company, recently incorporated with a capital stock of $30,000, is planning to install an electric power plant to supply energy to operate machinery in the mines.

WASHINGTON, D. C.—Bids will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until June 17 under specification 3046 for two hydro-pneumatic gate elevators for dry docks at Philadelphia, Pa., and Norfolk, Va. The cost is estimated at $15,000.

WASHINGTON, D. C. — Extensions are being made by the Potomac Electric Company to provide service for the many additional government buildings in Washington and to the camps and cantonments established around the city. A 15,000-kw. generating unit was installed in January, 1917, and orders have been placed for another unit of the same capacity, which is promised for delivery July 5, 1918. The company is now negotiating for a third generator of the same size. Boiler equipment for this additional power is also being installed. Additional substation equipment has been purchased, and the company is negotiating with the goverment to supply steam heat for certain new buildings of the government if erected near the station.

North Central States

GRAND RAPIDS, MICH.—Plans are being prepared by the Wernette-Bradfield Mead Company for remodeling the power plant of the Holland Furniture Company.

HOUGHTON, MICH.—The Peninsular Power Company of Houghton is building a power plant on the Brule River. The plans provide for a development of 5000 hp.

LIMA, OHIO.—An election will probably be called in August to submit a proposal to issue bonds for the installation of a municipal street-lighting system, instead of renewing the existing contract.

MIDDLETOWN, OHIO.—The County Commissioners have awarded the contract for lighting the viaduct between Middletown and West Middletown to the Beattie Electric Company of Cincinnati, at $3,143.

DEERING, KY.—The Deering Telephone Company, recently incorporated, is contemplating the installation of a 25-mile telephone system. A. B. Johnson is president.

Construction

News of Projects, Plans, Bids and Contracts. Notes on Work Under Way

LOUISVILLE, KY.—A new garage, to cost about $20,000, is being erected by the Columbia Truck Company, 119 South Seventh Street, Louisville. Equipment, including a drill press, overhead crane and general shop equipment, will be required.

ATTICA, IND.—Plans are being prepared for the construction of a new electric-light plant and water-works system for the Attica Electric & Power Company, to cost about $100,000. Ruebel & Wells, Chemical Bank Building, St. Louis, Mo., are engineers. R. H. Freeland is superintendent.

CONNERSVILLE, IND.—Plans are being considered by the Indiana Lamp company for the construction of an addition to its plant, to cost about $50,000. F. M. Ansted is manager.

GARY, IND.—The Gary Street Railway Company is contemplating an extension on East Fifth Avenue to the Aetna guncotton plant, 2 miles east of Broadway.

MADISON, IND.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until July 5 for conduit and wiring, gas piping and lighting fixtures in the United States post office at Madison. For details see Searchlight Section.

CHICAGO, ILL.—Contracts have been awarded by the Commonwealth Edison Company, 223 East Grand Avenue, for the erection of an addition to its power plant, to cost about $8,000.

CHICAGO, ILL.—The former plant of the Allis-Chalmers Company at Washtenaw Avenue and Twelfth Street has been purchased by David A. Wright, 568 Washington Boulevard, Chicago, manufacturer of machine tools, which is being equipped with machinery for manufacturing Fifield lathes, special double-end gun boring and turning lathes, etc. The main building is 140 ft. by 500 ft., and is equipped with a traveling crane. Electricity will be used as motive power.

JACKSONVILLE, ILL.—Plans are being considered by the Board of Education for the construction of a new high school building, including boiler house, metal shop and smokestack, to replace building destroyed by fire several weeks ago. The cost is estimated at $175,000.

BRODHEAD, WIS.—Preparations are being made for remodeling the municipal electric light plant, at a cost of about $35,000. The Power Engineering Company, Corn Exchange Building, Minneapolis, Minn., has charge of the enginering work.

CHIPPEWA FALLS, WIS.—The old lighting plant of the Wisconsin-Minnesota Light & Power Company was recently put out of commission when the flume leading from the canal to the wheels of the plant gave way. The lighting plant will now be permanently abandoned.

CLINTONVILLE, WIS.—A syndicate of local business men has acquired practically the entire water-power rights on the Little Wolf River at Little Wolf, Phillips, Ostrander and Royalton, Wis. Tentative plans are being prepared to construct dams and hydroelectric power plants to develop about 2500 hp. The initial work may begin this year. W. A. Olen, president of the Four Wheel Drive Automobile Company of Clintonville, is interested in the project.

CUDAHY, WIS.—Contract has been awarded by the Ladish Drop Forge Company, Park Avenue, to Klug & Smith, consulting engineers, Mack Block, Milwaukee, to prepare plans and construct an addition 50 ft. by 60 ft. to its boiler house.

MONROE, WIS.—Contract has been awarded by the Marty-Gempeler Company to Wagner & Bauman of Monroe for construction of cheese factory, warehouse and power house, to cost about $18,000. Claude & Starck of Madison are architects.

NEW LONDON, WIS.—A contract for addition to the municipal power house has been awarded to V. Thomas of New London.

NIAGARA, WIS.—The Trustees of the village of Niagara have granted the Niagara Light & Power Company a franchise to supply electricity in Niagara, subject to the approval of the Public Utility Commission.

WAUSAU, WIS.—Plans for the installation of a central heating and lighting plant in Wausau are reported to be under consideration by the merchants of Wausau.

WEST ALLIS, WIS.—Ground has been broken for the foundry unit of the new manufacturing group of the Universal Machinery Company, 784 Thirtieth Street, Milwaukee. Contracts will soon be awarded for the machine shop unit, which will be 150 ft. by 480 ft. Frank E. Gray and Val. A. Siebert, associated architects, 86 Michigan Street, Milwaukee, are preparing plans. E. L. Devlin is president.

WEST BEND, WIS.—A two-story addition, 25 ft. by 40 ft., is being erected at the plant of the West Bend Heating & Lighting Company. New equipment, including automatic stoking and coal and ash-handling equipment will be installed.

DULUTH, MINN.—Plans are being prepared by the Duluth Street Railway Company to extend its railway from South Superior to Oliver.

PINE CITY, MINN.—The Eastern Minnesota Power Company of Pine City has extended its electric transmission line through Bodum.

APPLETON CITY, MO.—Contract has been awarded by the Missouri, Kansas & Texas Railway Company to the Queen City Electric Company of Sedalia for electric wiring in connection with the erection of a number of buildings, etc., at Appleton.

INDEPENDENCE, MO. — Arrangements are being made by local business men for the location of an electric railway from Independence to Sugar Creek, a small industrial center, about 1½ miles from this city. The cost of the proposed railway is estimated at about $50,000, of which about $13,000 has been subscribed. The Kansas City (Mo.) Railways Company will construct and operate the line. Preliminary surveys have been made.

KANSAS CITY, MO.—Contract has been awarded by the Kansas City Railways Company for the erection of substation No. 2 to L. Breitag & Son Construction Company, 3701 West Prospect Place, Kansas City. The building will be 43 ft. by 82 ft., and will cost about $25,000.

KIRKWOOD, MO.—The sale of the municipal electric generating plant to the Union Electric Light & Power Company of Webster Groves is reported to be under consideration by the Board of Aldermen. It is not proposed to sell the distributing system, but to purchase energy from the Union company, for local distribution.

ST. JOSEPH, MO.—The St. Joseph Warehouse Cold Storage Company is reported to be contemplating the installation of new ice-manufacturing machinery, etc., to cost about $50,000. H. R. Worsley is architect and engineer.

BANCROFT, NEB.—Material for power house and equipment for the new municipal electric light plant have been received. The cost of the proposed system is estimated at about $45,000.

BELVIDERE, NEB.—Lighting bonds to the amount of $7,000 for the town of Belvidere have been approved by the State auditor.

FALLS CITY, NEB.—Bonds to the amount of $60,000 for improvements to the municipal electric-light plant in Falls City have been approved by the State auditor.

SYRACUSE, NEB.—Preparations are being made for the installation of new equipment in the municipal electric light plant, for which bids have been received. The cost is estimated at $7,500.

THURSTON, NEB.—The installation of an electric lighting system in Thurston is under consideration.

KANSAS CITY, KAN.—The Contractors' Machinery Company of Kansas City, Kan., is contemplating the purchase of two 500-hp. water-tube boilers and other equipment.

Southern States

HIAWASSEE, N. C.—A decision handed down by the court permits the Carolina-Tennessee Power Company to construct a hydroelectric power plant on the Hiawassee River in Cherokee County near the Tennessee State boundary. The properties include land and water rights for a distance of 26 miles. The project includes the construction of two dams, each 150 ft. high, one near Tennessee and the other 13 miles up the river, to develop about 60,000 hp. W. V. M. Powelson, care of Bertram, Griscon & Company, 421 Chestnut Street, Philadelphia, Pa., is engineer.

SPRAY, N. C.—Plans and specifications are being prepared for the erection of two large mill buildings, one a one-story weave shop, 1300 ft. by 250 ft., and the other a four-story spinning mill, 1300 ft. by 150 ft., by the Carolina Cotton & Woolen Mills Company at Fieldale. The initial unit will provide for 75,000 spindles and will cost about $2,000,000. The ultimate plan is for a total of 300,000 spindles and accompanying looms. The general land developments for the village are progressing and many buildings for dwellings, offices, etc., are in course of construction. The Carolina Cotton & Woolen Mills Company is controlled by Marshall Field & Company of Chicago, Ill.

FLORENCE, S. C.—The Florence Ice & Fuel Company, recently organized, is reported to have purchased the ice plant of the Carolina Gas & Electric Company.

FLOVILLA, GA.—An election will probably be called soon to submit to the voters the proposal to issue $25,000 or $30,000 in bonds for the installation of an electric-light plant and water-works system.

WAUCHULA, FLA.—The Wauchula Light & Power Company is contemplating the installation of a fertilizing mixing plant of 5 tons capacity, and also a crate mill with a daily capacity of 2000 packages.

CHATTANOOGA, TENN.—The F. J. Lewis Manufacturing Company has purchased a site (five acres) adjoining the oven plant of the Chattanooga Coke Company, on which it proposes to erect a coal tar distilling plant, 200 ft. by 64 ft., to cost about $40,000. The plans provide for a power plant, several stills steel tanks, etc. Contract for buildings has been awarded to the Mark Wilson Company of Chattanooga. W. H. Lewis, 2500 South Robey Street, Chicago, Ill., is vice-president.

JONESBORO, TENN.—Plans have been prepared by the Pleasant Valley Telephone Company for the construction of a new metallic telephone system to Johnson City, a distance of about 10 miles.

ANNISTON, ALA.—A company has been organized to build an electric railway from Anniston to Camp McClellan. The company is capitalized at $200,000 and as soon as permission is granted by the War Department to enter the reservation, work on the railway, it is expected, will begin. W. H. McKleroy is president and W. H. Weatherly is vice-president. James Mitchell, president of the Alabama Power Company, is interested in the company.

CHENEYVILLE, LA.—An election will soon be called to submit to the voters the proposal to issue $16,000 in bonds for the installation of an electric-lighting plant and water-works system in Cheneyville.

NEW ORLEANS, LA.—Bids will be received by the lighthouse inspector, New Orleans, La., until June 21 for two 15-hp. kerosene engines, electric ignition; two air compressors, fuel, air and cooling tanks, etc. Further information may be obtained upon application to the above office.

RAYNE, LA.—Bonds to the amount of $35,000 have been voted for improvements to the municipal electric-light plant and water-works system.

DENISON, TEX.—The construction of a new passenger station and repair shop in Denison, to cost about $10,000, is under consideration by the Texas Electric Railway Company.

LUFKIN, TEX.—The Lufkin Electric Lihgt & Power Company is contemplating the installation of additional machinery at its plant. The capital stock of the company has been increased from $30,000 to $45,000.

SWEETWATER, TEX.—Dr. A. W. Caufil would like to receive information on an individual lighting system in connection with remodeled building for bathhouse and massage parlors and other buildings, comprising a sanitarium.

WACO, TEX.—The Waco Electrical Supply Company has increased its capital stock from $20,000 to $30,000.

WICHITA FALLS, TEX.—Bids will be received until June 25 by the State of Texas, W. P. Hobby, Governor, Austin, for the erection of buildings for the Northwest Texas Insane Asylum. Separate bids to be submitted on each building. Funds to the amount of $385,000 are available for the work. Charles H. Page & Brother of Austin are architects.

Pacific and Mountain States

GROUND MOUND, WASH.—Bids will be received by the State Board of Control, Olympia, until June 21 for the construction of cottage and power house at the State School for Girls near Grand Mound. The power house with equipment will cost about $15,000. Plans are on file at the above office and at the office of George W. Lawton, Alaska Building, Seattle.

LA CROSSE, WASH.—Local business men are considering asking the Washington Water Power Company of Spokane to take over the local electric plant and extend its electric transmission line from Endicott to La Crosse.

SEATTLE, WASH.—A permit has been granted to the Puget Sound Traction, Light & Power Company for the erection of a reinforced concrete smokestack, 225 ft. high, to cost about $15,000.

SEATTLE, WASH.—The Heffernan Engine Works are rebuilding their plant and will install considerable new machinery. The company manufactures marine engines and deck equipment.

SEATTLE, WASH.—The Stone & Webster Engineering Corporation will begin

work at once on the construction of a power station for the Puget Sound Traction, Light & Power Company, to be located at 6500 Fourteenth Avenue, South Seattle, to cost about $30,000.

SEATTLE, WASH—Bids will be received by the Board of Public Works of Seattle until June 21 for furnishing one 1000-kw. motor-generator set for the City Light Department. This will be installed in the substation being erected to supply power to the Seattle municipal railway.

HOOD RIVER, ORE.—The Pacific Power & Light Company has recently completed a link in the high-voltage transmission line near White Salmon, Wash., connecting the Hood River and White River plants with the large plant of the Northwestern Electric Company on the White Salmon River. Energy is transmitted across the Columbia River over six cables.

PORTLAND, ORE.—Projects of the Portland Railway, Light & Power Company, involving an expenditure of $1,550,000, have been approved by John R. Lewis, state engineer, to increase the power facilities in Portland by development of water rights on the Clackamas River. One of the projects approved is for the appropriation of 667 second ft. of water, together with the waters of the Clackamas River, for development of 10,000 hp. The proposed plans will involve the construction of a flume 4 miles long, with a power plant, to cost about $1,250,000. Another application calls for the construction of the Timony Meadows reservoir on Oak Creek in Clackamas County of 40,400 acre-ft. of water. This project includes the construction of a dam 80 ft. high and 440 ft. long, to cost about $300,000. These projects were started by the company several years ago and later dropped.

LOS ANGELES, CAL.—The Pacific Electric Railway Company is contemplating the construction of an extension to Yucaipa as soon as possible.

OAKLAND, CAL.—The San Francisco-Oakland Terminal Railways Company is planning to build an extension to the Moore shipbuilding yards in Oakland.

ONTARIO, CAL.—The Ontario Power Company, which supplies electricity in Ontario and Upland, has petitioned the State Railroad Commission for permission to develop an additional source of power, which will necessitate an expenditure of about $60,000. The company contemplates a hydroelectric development just above Hog's Back in San Antonio Canyon.

SAN DIEGO, CAL.—On May 21 connection was made between the Southern California Edison Company's transmission lines at San Juan Capistrano and the San Diego Consolidated Gas & Electric Company. The latter company is now purchasing a considerable part of its electrical energy from the Southern California company, this energy being generated by water power.

SAN FRANCISCO, CAL.—The Board of Public Works has awarded contract to the General Electric Company for furnishing and delivering electric locomotives at the Hectchy Hetchy site, at $39,162.

MILFORD, UTAH.—Preparations are being made for the development of the sulphur mine northeast of Milford on the Beaver-Milford County line. The Beaver River Power Company of Beaver, it is understood, expects to erect an electric transmission line to the mine.

VERDI, NEV.—The power plant of the Verdi Lumber Company was damaged recently, causing a loss of between $20,000 and $30,000.

Canada

BURNABY, B. C.—The local stations of the British Columbia Electric Railway Company were recently destroyed by fire.

ELMIRA, ONT.—The Elmira Machinery & Transmission Company, Church Street, is planning to build an addition to its plant, to cost about $60,000. E. Vice is manager.

Miscellaneous

PANAMA.—Bids will be received at the office of the general purchasing agents, the Panama Canal, Washington, D. C., until June 26 for furnishing cable, wire rope, brass tubing, porcelain insulators, bridle and aerial cable rings, signal gongs, etc., under circular 1220. Further information may be obtained at the above office.

Record of Electrical Patents

Notes on United States Patents

(Issued May 14, 1918.)

1,266,435. TELEPHONE INSULATOR; Roy W. English, Victoria, B. C., Canada. App. filed June 30, 1917. Glass or porcelain insulators whereby the line wires can be securely gripped.

1,266,440. TAP CONNECTOR FOR ELECTRIC CONDUCTORS; Morris F. Finkelstein, New York, N. Y. App. filed May 22, 1917. Binds the connector to the cable in a simple, reliable and effective manner.

1,266,441. ELECTRIC CONNECTOR; Morris F. Finkelstein, New York, N. Y. App. filed May 22, 1917. In form of a duplex clamp.

1,266,460. TROLLEY POLE; Peder Hammer, Chicago, Ill. App. filed Jan. 13, 1917. Has means for locking the pole.

1,266,473. ELECTRICAL MEASURING APPARATUS AND METHOD OF OPERATING THE SAME; Charles A. Hoxie, Schenectady, N. Y. App. filed May 19, 1916. Includes a thermo-cell.

1,266,478. METHOD OF PRODUCING SILICON-CARBIDE ARTICLES; Otis Hutchins, Niagara Falls, N. Y. App. filed March 3, 1917. Uses electric furnace of the type ordinarily employed in the production of carborundum.

1,266,479. FUSE; Victor G. Jensen, Chicago, Ill. App. filed Sept. 18, 1916. Improved type of cartridge fuse.

1,266,480. TRANSFORMER; Svend E. Johannesen, Pittsfield, Mass. App. filed Dec. 11, 1915. Transformer terminal boards.

1,266,487. TACHOMETER; Petrus van Santen Kolff, Philadelphia, Pa. App. filed May 2, 1916. Electrical speed-indicating mechanism.

1,266,516. HIGH-POTENTIAL INSULATOR; Sadaji Momota, Tokio, Japan. App. filed June 14, 1916. To prevent creeping or surface discharge.

1,266,517. RECTIFIER; George S. Meikle, Schenectady, N. Y. App. filed Oct. 9, 1914. Improvements.

1,266,530. TELEPHONE TRANSMITTER; John Z. Miller, Erie, Pa. App. filed April 18, 1917. Improvements in the diaphragm.

1,266,727. CIRCUIT CONTROLLER; Thomas E. Barnum, Milwaukee, Wis. App. filed April 8, 1916. Provides contact-supporting means.

(Issued May 21, 1918.)

1,266,548. ELECTRIC SWITCH; Harry L. Bradley, Milwaukee, Wis. App. filed May 22, 1916. Relates particularly to that type which is operated magnetically.

1,266,555. APPARATUS AND METHOD FOR OPERATING SWITCHES; Roy V. Collins, New York, N. Y. App. filed May 13, 1913. Provides a switch automatically controlled by the condition of the motor circuit of an approaching car.

1,266,557. FILM-FORMING ELECTROLYTE; John Coulson, Wilkinsburg, Pa. App. filed May 3, 1916. Provides an electrolyte which shall be capable of acting upon film-forming metals to produce dielectric films.

1,266,558. PROTECTIVE DEVICE; Elmer E. F. Creighton, Schenectady, N. Y. App. filed Feb. 17, 1915. Relates to protective devices for maintaining continuity of service on transmission lines under short-circuit conditions.

1,266,566. BAROMETRIC VALVE; Earl E. Eby, Wilkinsburg, Pa. App. filed July 6, 1915. Relates to valves of the barometric type.

1,266,570. MEASURING DEVICE; Sidney W. Farnsworth, Pittsburgh, Pa. App. filed July 3, 1916. Means for accurately determining variations in temperature and pressure by the use of a resistor.

1,266,571. COIL RETAINING AND VENTILATING MEANS; Allan B. Field, Westcliffe-on-Sea, England. App. filed Feb. 5, 1914. Relates particularly to rings adapted for employment in the rotors of turbo-generators and similar machines.

1,266,573. SHOTGUN; George Fleming, Princeton, Tex. App. filed Jan. 18, 1917. Provides a trigger-operated gun which closes an electrical circuit.

1,266,575. TERMINAL CONNECTION; Richard H. Frank, Malta, Mont. App. filed May 24, 1917. Improvements in terminal connections, adapted for use with high-tension cable wires.

1,266,586. SYSTEM OF CONTROL; Arthur J. Hall, Wilkinsburg, Pa. App filed March 4, 1916. Provides a control system for the operation of the driving motors of an electric locomotive.

1,266,592. SYSTEM OF CONTROL; Rudolf E. Hellmund, Pittsburgh, Pa. App. filed March 4, 1916. A means is employed for effecting a uniform rate of deceleration of momentum-driven dynamo-electric machines.

1,266,593. CONTROL SYSTEM FOR ALTERNATING-CURRENT COMMUTATOR-MOTORS; Rudolf E. Hellmund, Pittsburgh, Pa. App. filed March 13, 1916. Provides a system whereby the motor may be started and accelerated in a smooth and uniform manner with ample torque.

1,266,599. CARTRIDGE FUSE; Alfred E. Johnson, Denver, Col. App. filed Dec. 20, 1915. Divides the interior of the cartridge into two compartments by means of a partition.

1,266,604. ELECTRICAL MEASURING INSTRUMENT; Paul MacGahan, Pittsburgh, Pa. App. filed April 29, 1915. Relates to power-factor meters for polyphase electric circuits.

1,266,607. CONTROL SYSTEM; Paul L. Mardis, Altoona, Pa. App. filed May 3, 1915. Relates to control systems for dynamo-electric machines and to four equipments of the series-parallel type.

1,266,614. SEAL; Harold A. Newcomb, Wilkinsburg, Pa. App. filed Jan. 6, 1915. Relates to gas-tight seals between glass and metal.

1,266,615. INSULATOR CLAMP; David S. Nicol, Quebec, Canada. App. filed July 23, 1917. Insulator clamps securable to the large insulator of power-transmission line for supporting air-break switches, lightning arresters and the like.

1,266,623. TELEPHONE SIGNALING SYSTEM; Ralph K. Quass, New York, N. Y. App. filed July 1, 1916. Relates to a system of the type in which automatic switches are employed for controlling the connecting and signaling circuits.

1,266,630. AUTOMATIC-DUMPING TRANSPORT SYSTEM; William Ross and Walter F. J. Cosser, South Porcupine, Ontario, Canada. App. filed June 4, 1917. Relates to transport systems in which dump trucks provided with outlet doors run on suitable rails.

1,266,642. AUTOMATIC MOTOR STARTER; Herman L. Van Valenburg, Milwaukee, Wis. App. filed Aug. 21, 1916. Device will automatically control the circuit relations of the different sections of starting resistance.

1,266,645. TELEPHONE-EXCHANGE SYSTEM; Harry G. Webster, Chicago, Ill. App. filed May 29, 1914. Consists in the provision of improved means for automatically extending a calling line to an idle operator.

1,266,652. ELECTRICITY METER; Jacob W. Bard, Springfield, Ill. App. filed June 7, 1915. Relates to direct-current watt-hour meters of the mercury motor-meter type comprising a rotating armature immersed in a mercury bath.

1,266,841. TELEGRAPHIC RECEIVER; Edwin W. Mayfield, Chicago, Ill. App. filed May 29, 1916. Improved means for receiving telegraphic signals with speed and secrecy and at a minimum of discomfort to the receiving operator.

1,266,879. ELECTRICAL HEATING APPARATUS FOR PERMANENTLY WAVING HAIR; Eugene F. Suter, London, England. App. filed Aug. 6, 1917. An improved electrical heater arranged so that the heat can be applied to and distributed over the different parts of the coiled hair.

1,266,887. CONDUIT CAP FOR ELECTRIC INSTALLATION; Wheeler H. Vibber, New London, Conn. App. filed Nov. 28, 1916. An improved conduit cap for use as an end terminal for electric installation.

1,266,897. CIRCUIT CONTROLLER; Paul H. Zimmer, Milwaukee, Wis. App. filed April 8, 1916. Circuit controllers adapted for starting alternating-current motors.

1,266,898. ELECTRICAL SYSTEM; Carroll R. Alden, Detroit, Mich. App. filed Feb. 4, 1916. A simple and efficient means for controlling the resistance of ignition circuits.

1,266,911. VAT FOR ACCUMULATING BATTERIES OR THE LIKE; Georges Bouton, Paris, France. App. filed Dec. 10, 1917. Relates to an arrangement which simplifies the fitting and facilitates the cleaning of the various parts.

1,266,917. ALTERNATING-CURRENT SOLENOID; George A. Burnham, Saugus, Mass. App. filed Sept. 28, 1916. A form of solenoid adapted to be associated with a circuit breaker or switch.

1,266,920. SIGNAL BOX HAVING LOCAL ALARM; Frederick W. Cole, Newton Highlands, Mass. App. filed April 19, 1915. Improved means whereby a local alarm or bell is sounded at the box concurrently with the actuation of the mechanism for transmitting the signal.

1,266,931. POLARITY-INDICATING MECHANISM FOR X-RAY APPARATUS; Charles Fayer, New York, N. Y. App. filed May 18, 1916. Relates to X-ray apparatus in which a high-potential current discharge is sent through an X-ray vacuum tube.

1,266,941. ELECTRICAL HEATING APPLIANCE; Cedric E. Heller, Milwaukee, Wis. App. filed Oct. 26, 1917. Provides means whereby any gas range may be readily converted into an electrical range.

1,266,978. TELEPHONE EXCHANGE SYSTEM; Roy E. Noble, New York, N. Y. App. filed Nov. 6, 1916. Extension telephone lines terminating at a private branch exchange may make outgoing calls during the period when no operator is at the private branch exchange.

1,266,979. PLUG; George W. Norgate, Chicago, Ill. App. filed June 16, 1914. Relates to plugs or connecting devices adapted to establish circuit connections with the customary form of threaded socket.

1,266,988. AMPLIFYING RECEIVER; Edwin S. Pridham and Peter L. Jensen, Napa, Cal. App. filed July 3, 1916. Receivers of this type of conducting coil for telephone currents disposed in a magnetic field so as to cut transversely the lines of force of the field.

1,267,013. TRANSFORMER; Chester M. Thordarson, Chicago, Ill. App. filed Sept. 27, 1915. Means for adjusting transformer to potential drops along the transmission line.

1,267,018. TRANSMITTING APPARATUS FOR WIRELESS TELEGRAPHY AND TELEPHONY; Georg von Arco and Alexander Meissner, Berlin, Germany. App. filed March 6, 1914. A transmitting station for wireless telegraphy and telephony in which the high-frequency currents are produced in a generator switch.

1,267,031. TELEPHONE TRUNK CIRCUITS; Bernard D. Willis, Chicago, Ill. App. filed Aug. 23, 1916. Interoffice trunk circuits for use in automatic telephone systems.

1,267,044. ELECTRIC WATER PURIFIER; Edward M. Barnes, Hastings, Mich. App. filed June 30, 1917. Provides an electric water purifier of type in which spaced electrodes are immersed in the water to be purified.

1,267,060. ELECTRIC HORN; William W. Dean, Chicago, Ill. App. filed Oct. 15, 1913. Improvements in electric signal horns or alarms.

1,267,068. RECORDER FOR TELEGRAPH MESSAGES; Reid G. Ford, Brooklyn, N. Y. App filed Jan. 21, 1916. Consists in mechanism connected with the sending instrument by which a complete record of all messages sent is automatically taken.

1,267,069. ELECTRICALLY CONTROLLED TEMPERATURE REGULATOR; Henry W. Grom and Frederick Terry, Pasadena, Cal. App. filed June 14, 1917. Relates to an electric contact switch and a thermostatic control therefor.

1,267,097. AUTOMATIC TELEPHONE SYSTEM AND APPARATUS; Talbot G. Martin, Chicago, Ill. App. filed March 26, 1907. Relates to automatic systems in which step-by-step actuated and electrically propelled switches are employed for extending connections to systems.

1,267,104. HEAT-CONTROLLING DEVICE; Henry A. Moore and Albert H. Brunner, Burbank, Los Angeles, Cal. App. filed Dec. 6, 1916. An electrical thermostatic control adapted for use in incubators and the like.

1,267,113. PARTY-LINE TELEPHONE SYSTEM; Winfred T. Powell, Chicago, Ill. App. filed April 27, 1916. Automatic party-line telephone systems in which connections are established through the medium of subscriber-controlled switches.

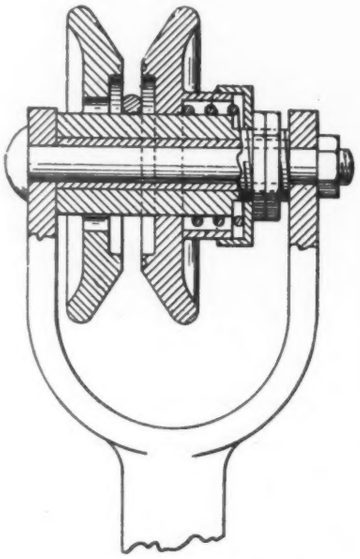
1,267,120. ELECTRODE; Ferdinand A. Rudolf, New York, N. Y. App. filed Aug. 15, 1916. Provides suspended electrodes of such construction that the loss of precious metal values in the refining process is practically eliminated and the deposit of the desired metal is substantially pure.

1,267,131. AUTOMATIC OR SEMI-AUTOMATIC TELEPHONE SYSTEM; Arthur B. Smith, Evanston, Ill. Has for its object the provision of a system in which phantom circuits are employed for establishing connections.

1,267,141. TOTALLY SUBMERGED ELECTRODE; Harry G. Stout, New York, N. Y. App. filed July 26, 1916. Forms the plates and constructs the tanks in which the plates are held so that all the plates are totally submerged beneath the electrolyte when in use.

1,267,148. IGNITION MECHANISM FOR INTERNAL-COMBUSTION ENGINES; Harry Randolph Van Deventer, Sumter, S. C. App. filed Dec. 19, 1914. Has for its purpose the provision of an igniter bracket upon which a magneto may be mounted.

1,267,156. CONTACT-MAKING VOLTMETER; Fred H. Winter, Schenectady, N. Y. App. filed March 1, 1917. Relates to contact-making voltmeters in which electromagnetic holding means are employed to prevent chatter of the contacts.



1,267,338—Trolley Wheel

1,267,165. FIRE-ALARM PROTECTIVE DEVICE; Mario Arnavas, San Francisco, Cal. App. filed July 24, 1917. Relates to that class of fire-alarm signal stations in which a booth is provided having a door automatically locked.

1,267,173. ELECTRIC HEATING DEVICE; Arthur Francis Berry, Ealing, England. App. filed Nov. 28, 1916. An electric heating device comprising a grid-like structure.

1,267,181. ELECTRIC CIRCUIT-CONTROLLING SWITCH; Frank J. Camatta, Tonasket, Wash. App. filed Feb. 7, 1916. A cut-out switch for use in connection with electric current meters.

1,267,198. ELECTRIC METER; Evan Evans, Berlin, Germany. App. filed Feb. 10, 1914. A type of electric peak meter in which the armature is subjected to a constant counter-torque corresponding to a definite and predetermined rate of consumption of energy.

1,267,199. INCANDESCENT-CATHODE ARC DEVICE; Charles V. Ferguson, Schenectady, N. Y. App. filed Sept. 20, 1915. Relates to electrical discharge devices of the incandescent cathode type having a gaseous filling.

1,267,213. DEMAND-LIMITING APPARATUS; Chester I. Hall, Fort Wayne, Ind. App. filed April 26, 1916. Provides a demand-limiting device which will interrupt or modfy the current flow in an electric circuit.

1,267,214. POSITION INDICATOR OR RECORDER; Chester I. Hall, Fort Wayne, Ind. App. filed June 15, 1916. Devices for reproducing or indicating the movement of a primary movable member at some point more or less remote from the primary member.

1,267,216. MOTOR CONTROL; Williams S. H. Hamilton, Schenectady, N. Y. App. filed July 6, 1917. Relates to multiple-unit control of the pilot motor type.

1,267,222. SAFETY TOP FOR SWITCHES; Charles H. Hill, Schenectady, N. Y. App. filed Nov. 13, 1915. A safety device for knife-blade switches to prevent them being closed accidentally.

1,267,223. PROTECTIVE DEVICE FOR TELEPHONE CIRCUITS; George H. Hill, Schenectady, N. Y. App. filed Nov. 13, 1915. A device which will automatically ground the telephone wires and will also interpose a positive barrier at the entrance to the telephone jack so that the telephone plug cannot be inserted.

1,267,232. MOTOR WINDING; Willem C. Korthals-Altes, Schenectady, N. Y. App. filed March 16, 1916. An improved arrangement of the stator winding for three-phase motors.

1,267,247. ELECTRIC COUPLING; Herbert D. Meeker, Niskayuna, N. Y. App. filed June 16, 1914. An automatic electric coupler designed for use upon moving vehicles arranged as trains.

1,267,251. METHOD OF MAKING METAL RINGS; Thomas R. Murray, New York, N. Y. App. filed Nov. 1, 1917. Making metal rings from flat bars or plates of metal in such a way that the ring when completed will be truly circular.

1,267,254. ELECTRIC WELDING MACHINE FOR MAKING METAL RINGS; Thomas E. Murray and Harry E. Woodrow, New York, N. Y. App. filed Dec. 10, 1917. Refers particularly to making rings or other endless shapes of metal.

1,267,255. APPARATUS FOR MAKING METAL CHAINS; Thomas E. Murray, New York, N. Y. App. filed Dec. 29, 1917. The apparatus comprises electrodes constructed to hold the link sections in suitable grooves in their opposing faces.

1,267,256. METHOD OF AND APPARATUS FOR ELECTRIC WELDING; Thomas E. Murray, New York, N. Y. App. filed Jan. 21, 1918. Apparatus for producing a projectile having means for guiding the same during flight.

1,267,258. ELECTRICAL WELDING APPARATUS FOR PIPE COUPLING; Thomas E. Murray, New York, N. Y. App. filed Feb. 16, 1918. Apparatus for welding reinforcing rings to pipe couplings.

1,267,259. METHOD OF AND APPARATUS FOR ELECTRIC WELDING; Thomas E. Murray and Joseph B. Murray, New York, N. Y. App. filed March 9, 1918. An apparatus comprising two electrodes and means for simultaneously preventing lateral expansion of both of said electrodes during the welding operation.

1,267,266. ELECTRICAL MEASURING INSTRUMENTS; Williard E. Porter, Lynn, Mass. App. filed May 26, 1916. Instruments of the D'arsonval type.

1,267,273. SEAT INDICATOR FOR THEATERS; Harry L. Rogers, Philadelphia, Pa. App. filed Sept. 17, 1915. Provides an indicator associated with each row of seats in a theater, the indicator being placed on the end of a row at a point so as to be seen from the rear of the building.

1,267,293. GUN; James G. Veteto, Amity, Ark. App. filed Oct. 15, 1917. Provides a magazine gun adapted for firing electric cartridges.

1,267,317. ELECTRIC GLASS FURNACE; John O. Erskine, Steubenville, Ohio. App. filed Nov. 21, 1917. Provides a glass-melting furnace or tank wherein the heat employed is produced by the conversion of electrical energy.

1,267,324. AUTOMATIC MOTOR STARTER; Hubert F. Krantz, Brooklyn, N. Y. App. filed Feb. 18, 1916. Provides an automatic device governing the lapse of time before the current is taken through the motor fuses.

1,267,338. TROLLEY WHEEL; John Longanecker and L. G. Stockberger, Hiram, Ohio. App. filed April 4, 1917. An improved wheel for the transmission of electricity to vehicles, the wheel comprising two sections.

1,267,342. CURRENT-COLLECTING DEVICE; Thomas W. Varley, New York, N. Y. App. filed Oct. 3, 1913. Provides a current-collecting or brush device that shall have a visible means for indicating the relative pressure of its brushes.

1,267,347. PROCESS OF ELECTRICAL REDUCTION; Charles H. Fulton, St. Louis, Mo. App. filed July 25, 1917. Consists in mixing a reducing agent with the substance to be reduced so as to form a loose granular mixture.

1,267,349. DRY-CELL BATTERY; Ralston F. Smith, Cleveland, Ohio. App. filed Jan. 4, 1918. Provides a dry-cell battery construction which will be economical of manufacture and will embody in the performance of its function a maximum of efficiency.